

THE DOCK & HARBOUR AUTHORITY

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Editorial

The Port of Ancona.

The Port of Ancona is situated on the east coast of Italy and is the largest port of call between Venice and Brindisi.

The existence of a harbour at Ancona can be traced back to very early ages, but it is only since 1870 that any consideration has been given to improving the port, and continual developments during the course of the last 60 years have now enabled Ancona to be considered as one of the principal ports of Italy.

Further extensions in the Port of Ancona are being undertaken now, and these include the construction of two breakwaters for the purpose of protecting the entrance to the port, the enlargement of one of the moles and important dredging works for the purpose of creating a canal of 4 metres in depth. For the undertaking of these works the Port of Ancona has been granted the sum of 150,000,000 lire from the Italian Government.

As regards traffic at the Port of Ancona, the number of ships calling there has increased considerably in the last few years, 1,764 ships arriving in 1932 with a net registered tonnage of 1,327,000, this being an increase of 339 vessels as compared with 1931. The departures from the Port of Ancona in 1932 included 1,771 ships with a net registered tonnage of 1,771,000, this being an increase of 346 ships as compared with 1931.

With regard to trade at the port, imports in the last two years have shown considerable decreases, the figures for 1930 being 646,000 tons; for 1931, 473,000 tons; and for 1932, 269,000 tons. Exports, on the other hand, have been steadily advancing, though as yet they have not reached the pre-war figure of 133,448 tons in 1913. In 1930 there were 63,000 tons of goods exported; in 1931, 64,000 tons; and in 1932, 81,000 tons.

The principal goods imported are coal and cereals, and whilst coal has shown a considerable dropping off in the last two years, cereals have been increasing, especially in 1932, as compared with 1931. Coal imports have decreased by 270,000 tons as compared with 1930, and cereals have increased by over 100,000 tons as compared with 1930.

The Port of Ancona forms the supplement for this month's issue, and an illustrated article on the port appears on another page.

Official Opening of Haifa Harbour.

It is eleven years ago since the question of constructing a harbour for Palestine was first given consideration, and after a thorough investigation of the coast it was decided, in 1927, to construct a harbour at Haifa, and this was officially opened by the High Commissioner for Palestine, Lieutenant-General Sir Arthur Wauchope, G.C.M.G., K.C.B., C.I.E., D.S.O., on October 31st.

The construction of a harbour at Haifa was estimated to cost £1,250,000, and work first commenced in 1929. The scheme consisted of the construction of a main breakwater $1\frac{1}{2}$ miles long and a lee breakwater about half a mile long, which was formed by extending the existing railway jetty. It was also necessary to reclaim an area of land for the purpose of constructing a wharf for cargo steamers and lighters, and a deep water berth about 1,400-ft. long has been provided for the purpose of accommodating 3 or 4 steamers and a quay 300-ft. long for the use of lighters.

Warehousing accommodation has been provided by the construction of two single-storey steel-framed transit sheds, which are connected up with railway and road facilities. A site has also been reserved for a maritime station. Provision has also been made for the construction of an oil dock in the near future, as an agreement has been reached whereby one branch of the Iraq oil pipe line will be discharged at Haifa.

The construction of this harbour at Haifa is a tribute to British engineering, and there is no doubt that with the up-to-date facilities provided, and when everything is completed, that Haifa will in the near future be one of the principal harbours in the Mediterranean.

An article describing the proposed development of the harbour at Haifa appeared in "The Dock and Harbour Authority" for February, 1931, and in next month's issue there will appear a more detailed article describing the works carried out.

The Public Works, Roads and Transport Exhibition.

The Royal Agricultural Hall, Islington, N., will again be the venue for the Public Works, Roads and Transport Exhibition from November 13th to November 18th, and the machinery which will be on show will include many articles of interest to those associated with dock and harbour work. A detailed list of some of the exhibits appears on another page in this issue.

King George V. Graving Dock.

The New King George V. graving dock at Southampton, the largest in the world, will probably be used for dry-docking purposes for the first time in January, when it is expected that the White Star liner *Majestic*, the largest liner afloat, will be dry-docked in connection with her annual overhaul.

During recent weeks the structure of the pumping station has been completed and the smaller pumps placed in position. The operation of installing the electrical switchboard and the main pumps will soon be completed. The next task is the placing of the keel and bilge blocks along the dock floor. It is expected that the dock will be ready to receive a ship for dry-docking by the beginning of January.

On the docks extension scheme rapid progress continues to be made with work on the second section of the deep-water quay wall. The last of the 70 concrete monoliths has been sunk to its final depth, and the work of coping the wall is now in progress. This is expected to be completed about the end of this year or the beginning of 1934, and then Southampton will be the proud possessor of 7,000-ft. of quay alongside which the largest liners of the world can lie at all stages of the tide.

The task of reclaiming 415 acres of mudland has gone on without interruption, and about half of the entire area has been reclaimed. The first section, dealing with 187 acres, has been practically completed, and the second section, dealing with 228 acres, is well in hand.

Two new berths in the first section were used for the first time during October.

New Free State Harbours Bill.

A second reading has been given to the Free State Harbours (Regulation of Rates) Bill now before the Dail. Under this Bill powers to fix rates by Free State Harbour Boards are to be given to the Minister for Industry and Commerce. The Bill is entitled "An Act to make provision for the regulation and control of the charges made by harbour authorities; to amend certain enactments relating to harbours, and to provide for other matters connected with the matters aforesaid."

Harbours under the control or management of the Commissioners of Public Works will not be affected by the Bill. In the case of other harbours it is proposed to empower the Minister to fix any or all of the rates to be charged by the Authority, with or without prior application from the authority or any party. Any Harbour Authority which fails to observe the rates fixed by the Minister will be liable to a fine of £50.

Provision is also made that any Harbour Authority which, on being required by the Minister, fails to furnish information regarding numbers and tonnage of vessels, cargoes, charges and revenues, etc., shall be liable to a penalty of £10 on conviction.

Port of Southampton Topics

September a Good Month at Southampton Docks.

September was a good month for Southampton Docks. The statistics just issued by the Southern Railway Company show very few decreases, and those almost negligible.

The gratifying feature is that every phase of port activity showed an increase, with the exception of the number of vessels which used the docks. There the total inward fell from 317 to 290, and outward from 315 to 288, a decrease of 27 in each instance.

That, however, did not affect the tonnage returns adversely. Gross tonnage inward rose from 1,606,297 tons in September, 1932, to 1,783,464 tons, and outward the total advanced from 1,566,780 tons to 1,831,805 tons. The respective increases were therefore 177,167 tons and 265,025 tons.

The net tonnage returns were equally satisfactory, the inward increase being 68,077 tons and the outward increase 119,573 tons. The totals were 918,297 tons inward and 953,058 tons outward.

Cargo returns showed a welcome increase. Imports dropped from 53,527 tons to 53,198 tons, a trifling decrease of 329 tons, whereas there was an increase of 4,879 tons in the exports, the total exports being 32,859 tons.

Passenger traffic also showed a handsome balance. Inward there was an increase of 4,765, from 35,888 to 40,653. Outward there was a decrease of 141, from 35,087 to 34,946. Troop traffic also increased, 4,691 troops leaving as compared with 3,063, an advance of 1,628.

Slight Improvement in Shipping at Southampton recently.

There are a number of small indications of improvement in shipping at Southampton in recent weeks. In a number of instances, chiefly concerned with calling lines, extra ships have been put on. The P. and O. Company, who have been doing a larger volume of cargo business out of Southampton in recent months, have now arranged for an extra steamer to call at Southampton on her way to the Far East.

It is also interesting to note that the Rotterdam Royal Mail Line, one of the oldest Continental companies connected with Southampton, has arranged to put on an extra steamer next year to cope with an anticipated increase in the homeward passenger trade from Batavia and the Mediterranean.

The third "straw" which shows the way the wind blows is that the German African Services are to have additional vessels sailing out of Southampton. The main additions are that the "Usaramo" and the "Tanganjika" will resume active service after being laid up for some months, and that the "Ussukuma" and the "Wangoni" will join the vessels at present operating the West Coast service.

The Orient Line's latest list of sailings on the Australian run indicate that arrangements have been made for five mail and passenger liners to call at Southampton in April and May of next year to land passengers and mails. Usually the ships call at Plymouth on the homeward voyage, but at the height of the season they are to come to Southampton.

Port of London Authority

London's Shipping.

During the week ended October 6th, 974 vessels, representing 899,143 net register tons, used the Port of London; 516 vessels (723,661 net register tons) were to and from Empire and foreign ports and 458 vessels (175,482 net register tons) were engaged in coastwise traffic.

* * * *

During the week ended October 13th, 1,188 vessels, representing 1,016,518 net register tons, used the Port of London; 530 vessels (807,013 net register tons) were to and from Empire and foreign ports and 658 vessels (209,505 net register tons) were engaged in coastwise traffic.

* * * *

During the week ended October 20th, 1,077 vessels, representing 918,224 net register tons, used the Port of London; 519 vessels (725,362 net register tons) were to and from Empire and foreign ports and 558 vessels (192,862 net register tons) were engaged in coastwise traffic.

Tilbury Passenger Landing Stage.

During the month of September, 45 vessels totalling 696,498 gross register tons used the Tilbury passenger landing stage. Altogether 13,774 passengers were embarked or disembarked at the stage, in addition to baggage and mails.

The Port of Amsterdam

The position of the Port of Amsterdam can be seen from the following figures in regard to number of vessels and tonnage and to the goods traffic arrived and sailed, as compared with the corresponding figures of last year:—

SEAGOING VESSELS AND TONNAGE.

		ARRIVALS				SAILINGS			
		No.	Per Cent.	N.R.T.	Per Cent.	No.	Per Cent.	N.R.T.	Per Cent.
Sept.	1932	238		315,581		246		318,560	
"	1933	257		331,950		278		374,483	
		-19↓	-8.0	+16,369	+5.19	+32	+13.00	+55,923	+17.55
August	1933	273		394,782		281		389,180	
Sept.	1933	257		331,950		278		374,483	
		+16	+5.86	-62,832	-15.92	+3	+1.07	-14,697	-3.78
Jan.-Sep.	1932	2,454		3,532,132		2,461		3,546,529	
"	1933	2,408		3,370,772		2,449		3,477,133	
		-46	-1.87	-161,360	-4.57	-12	-0.49	-69,396	-1.96

SEAGOING GOODS TRAFFIC (In Tons of 1000 Kilos*).

			1	2	3	4	5
			Import	Transit incl. in col. 1	Export	Transit incl. in col. 3	Total col. 1 & 3
August	1932	...	250,002	40,679	130,768	25,877	380,770
"	1933	...	320,274	69,637	131,276	57,095	451,550
			+70,272	+28,958	+508	+31,218	+70,780
			+28.11%	+71.19%	+0.39%	+120.64%	+18.59%
July	1933	...	313,407	52,857	138,094	46,243	451,501
August	1933	...	320,274	69,637	131,276	57,095	451,550
			+6,867	+16,780	-6,818	+10,852	+49
			+2.19%	+31.75%	-4.94%	+23.47%	+0.01%
Jan./Aug.	1932	...	2,277,738	396,665	1,019,194	259,355	3,296,932
"	1933	...	2,259,736	465,851	1,012,175	381,515	3,271,911
			-18,002	+69,186	-7,019	+122,160	-25,021
			-0.79%	+17.44%	-0.69%	+47.10%	-0.76%

*These figures have been taken from the monthly statistics of the Central Bureau, The Hague, Holland.

Marconi Beacon Stations in Chinese Waters

Following the example of many of the principal maritime nations of the world, the coastal authorities in countries as distant as Uruguay, Roumania, and China are among the most recent to adopt the Marconi automatic wireless beacon as an aid to navigation for ships approaching and leaving their shores.

Automatic wireless beacons, transmitting omni-directional signals which enable ships fitted with wireless direction finders to take bearings as and when required, have now become firmly established in the confidence of navigators on account of the convenience and simplicity of utilising their services. Their value is typified by the following report received from the wireless operator of a British ship shortly after the completion of the last Marconi beacon for the Chinese authorities:—

"The chain of wireless beacons at the entrance to the Shanghai River is now complete. During the past three months a beacon has been established on the island of Ta-chi-Shan, otherwise known as Gutzlaff. Since July 20th another beacon has been established at the lighthouse on the island of Shawei-shan, now making three beacons to the Shanghai River approach. On approaching Shanghai River from Japan I took full advantage of this co-ordinated service.

"The signals from the beacons are very steady and clear, and as the beacons follow each other immediately there is no waiting between the bearings. The co-ordination was perfect, and it is the finest beacon service on the Eastern route."

The third beacon station referred to in the report was installed by the Marconi Company in 1930 at North Saddle Island, near Shanghai, and it was in consequence of the successful operation of this station that the Chinese authorities arranged to equip the two other important navigational points near the mouth of the Shanghai River with similar apparatus of the latest type.

The Marconi beacon transmitters are characterised by extreme simplicity in operation and ability to run for long periods without attention by skilled personnel. The entire apparatus is controlled by a master clock which switches on the transmitting apparatus at pre-determined times, when the transmitter sends out a characteristic signal incorporating the call sign allotted to the beacon, after which the plant shuts down until the next call is again automatically transmitted. Provision is made so that the calls can be transmitted at comparatively long intervals during fine weather or continuously when foggy weather or unfavourable conditions of visibility prevail in the vicinity of the beacon.

Hull and the East Coast

Increased Imports at Hull Docks Causes Congestion.

THE docks at Hull have during the past month or two been busier than for some time; there have been large arrivals of grain, etc., besides which the import of timber has been on a considerable scale. The prohibition of Russian wood for several weeks and the uncertainty as to the duration of the embargo stimulated buying elsewhere—Scandinavia, Poland, Canada, etc.—with the result that numerous cargoes have been coming to hand. The lifting of the embargo later caused a very big influx from Russia, with the result that congestion was inevitable, notably at the Victoria Dock, where incoming vessels laden with timber were frequently in the river some days before a berth was available. The new facilities at this dock and the fine open weather, however, assisted matters somewhat, and the congestion was thus reduced as far as possible. The increase of imports of timber to the end of September was 170,000 loads and, although the million line may not be reached by the end of the year, the total is likely not to come far short of it. It is considered hardly probable that all the Russian wood contracted for will be shipped this season, but the Soviet authorities are doing their utmost to send as large a quantity as possible before the ports are closed by ice.

Imports of wheat and kindred cereals at Hull for the first nine months of the year exceed a million tons and include several cargoes of Russian wheat and barley from Black Sea ports. At 1,059,000 tons grain imports are 178,000 tons greater than at the same date last year. Oil seeds, nuts and kernels at 375,000 tons show a decline of about 90,000 tons. Imports of sheep's wool are at practically last year's level, but provisions and fruit are behind. Exports of coal are still a disappointing feature and have of late been materially affected by the reduced quota of production in the Yorkshire and Midland area, which so restricted supplies that exporters found it impossible to enter upon new business. The position has been relieved somewhat by an increase in production in October, but much more is required before the situation is righted, and the excellent appliances at the docks at Hull and the sister ports on the Humber are again made use of to normal extent. The exports of coal (foreign) from the Humber ports (Hull, Grimsby, Immingham and Goole) in the nine months to September 30th amounted to 2,358,309 tons, as compared with 2,404,948 tons in the corresponding period last year; and from Boston and Lynn 232,165 tons, against 237,372 tons. These figures, however, are comparatively small, the Humber total being just upon two millions less than what it was for the January-September period of 1930 before the Coal Mines Act and its restrictive regulations came into force. Shipments of bunker coal, however, are maintained, and are now over two million tons annually.

Trent Falls Improvement Works.

With reference to the Trent Falls Improvement Works, towards the extra cost of which the Humber Conservancy Commissioners have offered £30,000 additional to their first contribution of £76,000, the Aire and Calder Navigation have written the Board that while appreciating the offer, they are disappointed that the Commissioners had not acceded to the request to contribute one-half, or £56,000. A statement was enclosed with the letter showing the expenditure to December 31st last, together with the revised estimate of cost to complete the works, as follows:—

	Humber Wall	Trent Wall	Total
Expenditure	£41,497	£48,896	£90,393
Required to complete ...	12,740	86,074	98,814
Totals	54,237	134,970	189,207

The Navigation pointed out that it would be gathered from these figures that the sum of £56,000 which they were prepared to contribute towards the increased cost of the works was somewhat in excess of the estimated total cost of the Humber wall, and that about five-sevenths of the total estimated cost of the works in the River Trent. With a view to further considering the position, the letter suggested that representatives of the Board should receive a deputation from the Aire and Calder Navigation.

The request was considered at a special meeting of the Humber Conservancy Commissioners, at which the chairman (Mr. J. H. Fisher, J.P.) said that he felt bound on this occasion to suggest that the Board's representatives should be only those of Hull and Grimsby, though he admitted that it would be a departure from the usual practice of giving representation to all three ports: Hull, Grimsby and Goole. In defence of this, Mr. Fisher pointed out that Hull paid the biggest proportion of the income of the Board; that there was only a narrow margin between their income and expenditure, and that if that margin decreased and had to be supplemented it must be done from shipping dues.

Mr. Garstang, speaking for the Goole members, expressed himself in direct divergence to the chairman's views and urged that the representatives chosen should be from all the interests on the Board. Goole members, he said, could be quite as impartial in the consideration of any offer as could representatives of Hull and Grimsby. He suggested that the representatives of the Ministry of Transport on the Board could with advantage be included, and that in the event of the financial decision being considered unsatisfactory by Goole interests, they might present a minority report to the Board of Trade. In view of the possibility of such minority report, Mr. Garstang suggested that the Conservancy might agree to meet the Aire and Calder Navigation halfway and make an offer of £43,000—an additional £13,000, one-half the difference between the £30,000 already offered by the Board and the £56,000 asked for by the Navigation. Such a course, he believed, would be acceptable to the Aire and Calder Navigation. The deputy chairman (Mr. J. Bentley Bennett) urged that the matter be allowed to be impartially decided, and reminded the meeting that it was the Humber Conservancy Board and not the separate ports, who were to meet the deputation from the Aire and Calder Navigation. After some discussion representatives were appointed in accordance with the suggestion made by the chairman, after Mr. Garstang had withdrawn an amendment that Mr. Bentley Bennett and Mr. Craggs be added. Interviews accordingly took place, and in the result the sub-committee thus appointed reported that they could not recommend the Board to make any increase on the offer of £30,000. This, however, is not the end of the matter, for the minutes of the proceedings have yet to be confirmed, and by agreement they are to be submitted to the next monthly meeting of the Humber Conservancy Board late in October.

Electric Fog Horn to be installed at St. Andrew's Dock, Hull

At the St. Andrew's Dock, Hull, the Hull Steam Trawlers' Mutual Insurance and Protection Company are about to instal an electric fog horn on the roof of the company's new premises on the east side of the dock. It is proposed to sound the horn continuously during fog. The scheme of signals has been approved by the London and North-Eastern Railway, the owners of the dock. When the present fog bell has been replaced by the new apparatus it is hoped that the number of groundings of incoming trawlers will be considerably reduced.

Imports of Petroleum and Motor Spirit at Hull.

Russian Oil Products, Ltd., are intending to erect a barge jetty north of the Anglo-American Oil Company's at Hedon Haven in connection with the adjoining oil depôt at Saltend. This is apart from the two jetties with pipe lines owned by the London and North-Eastern Railway, where the large tankers discharge their cargoes. In the first nine months of the year 115,000,000 gallons of petroleum and motor spirit have been imported at Hull, or a million and a-quarter gallons more than in the corresponding period last year.

Annual Meeting of Bridlington Harbour Commissioners.

At the annual meeting of the Bridlington (East Yorkshire) Harbour Commissioners, Dr. T. C. Jackson, of Hull, was unanimously re-elected chairman and the Works and Finance Committees were reappointed *en bloc*. The resignation of Mr. C. R. Jones, treasurer, was received with regret, and Barclay's Bank, Ltd., appointed in his stead.

Port of Bristol Authority

"Facts and Figures," just issued by the Port of Bristol Authority, should be in the possession of every business man in any way associated with shipping. It is a handy vest pocket encyclopædia containing a wealth of interesting details concerning the port. How many, for example, are aware that the duty paid on tobacco entering the Port of Bristol in a single year amounts to £25,000,000, or that there is storage accommodation for 10 million bushels of grain. A list of the imports and exports, the countries from whence goods are shipped, dock and lock dimensions, the largest vessels entering the port, the capital expenditure, and many other interesting items are to be found in this little compendium.

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Protection of Timber Piles at Blyth Harbour

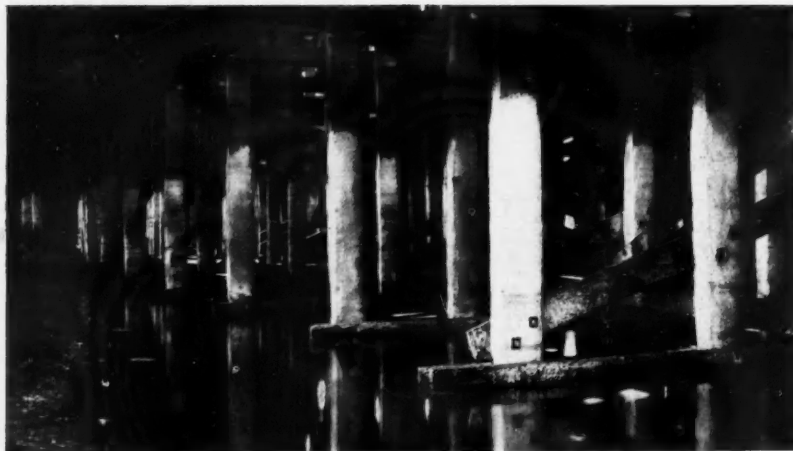


Fig. 1.

THE protection of timber piles, which have been attacked by marine organisms, was recently undertaken at Blyth Harbour, and the means of protection consisted of concreting the surface of the piles so as to avoid further damage occurring.

The method adopted for concreting the piles was by means of the cement gun which projects a fine grade concrete known as Gunitite on to the surface of the piles (Fig. 1).

The materials of which Gunitite is composed are Portland cement, sharp sand, and water. The selection of a suitable sand, graded $\frac{3}{4}$ -in. to fines and free from impurities, is of the first importance in securing good results.

The cement and sand are proportioned in the ratio of one to three and are thoroughly mixed and screened before charging into the Gun. They are then projected in a steady stream through the flexible delivery pipe to the point of application where the nozzle operator directs the discharge jet at the surface to be coated, the particles impinging on to it with considerable force. As the current of material passes through the nozzle itself a group of finely divided pressure sprays introduce water for hydration, which is thus intimately mixed with the particles of cement.

The gun pressure employed is usually about 35 to 40 lbs. per sq. in. and can be varied according to requirements. The volume of water used is under the close control of the nozzle operator, and there is no need to use excess water for securing workability, since the force with which the materials are projected is in itself sufficient to ensure that the Gunitite will be thoroughly consolidated and homogeneous. As the following description shows, Gunitite encasement can be placed in a much shorter time than is required when shuttering is erected and the concrete is placed in the ordinary manner.

At Blyth Harbour, Northumberland, the north side coaling staithes (Fig. 2) were constructed for the North-Eastern Railway Company in 1896, and consist of a gantry approximately 40-ft. high carrying standard gauge tracks for coal trains. The staithes are supported by trestles of timber piles constructed

by the Harbour Commissioners at approximately 15-ft. intervals, each trestle containing four or more 12-in. by 12-in. pitch pine piles. All timber work below H.W.M. in the harbour has been subject to the attack of the marine borer *Limnora lignorum*, and the ravages of this insect began to show on the piling of the staithes some years ago. It was necessary to protect the piles by some form of sheathing or encasement before the damage became serious, since the operation of coaling vessels daily would prevent putting the staithes out of service in order to drive new piles if the existing ones became so badly eaten away as to require replacement, and sheathing the piles in concrete from about half-tide level down to the river bed was started, the concrete cover allowed being about three inches in thickness placed behind shuttering. Nails were driven into the piles at 2-in. centres with the heads left projecting in order to give a bond between timber and casing. The shuttering and concreting below L.W.M. were carried out by a diver, and that above L.W.M. off floats at low water, the whole of the work being done departmentally.

This method proved very satisfactory, but it had some minor drawbacks, which in practice were of importance. Above L.W.M. there were a number of diagonal and transverse ties and rakers which necessitated repeated alteration of the shuttering panels. This not only increased the cost of the work, but also retarded progress considerably.

To avoid this, the harbour authorities decided to experiment with the cement gun for the portion of the work above L.W.M. in the expectation that the concrete could be placed very rapidly and that shuttering could be dispensed with altogether, thus avoiding all delays. The results of this experiment surpassed expectations, and a contract was accordingly placed for the casing of over 300 piles for an average height of 7-ft. above L.W.M.

In carrying out the work the cement gun plant was erected on the lower deck level, and piles were reached off rafts, the whole of the work being done on tidal shifts. Each pile was first scraped and scrubbed with wire brushes to remove limpets, borers, slime and dirt, after which $2\frac{1}{2}$ -in. clout nails were driven in at 4-in. centres and a light welded steel fabric with a 2-in. by 2-in. mesh of 16 gauge galvanised wire was wrapped round the pile and secured to the nails. The pile was then hosed down with water and the Gunitite casing shot in a single coat to a thickness of $1\frac{1}{2}$ -in. The mix used was 3 parts of sand from $\frac{1}{4}$ -in. down to 1 part of rapid hardening Portland cement. This hardened sufficiently to be undamaged by the rising tide, and no protection was found to be necessary, wave action being absent in this part of the harbour. The speed at which the work was executed may be gauged by the fact that a total of 317 piles were cased in a period of two months, the inclusive cost being considerably less than that of pouring the encasement behind shuttering.

The work was carried out by the Concrete Proofing Co., Ltd., 100, Victoria Street, Westminster, London, S.W.1, under the direction of Blyth Harbour Commissioners.

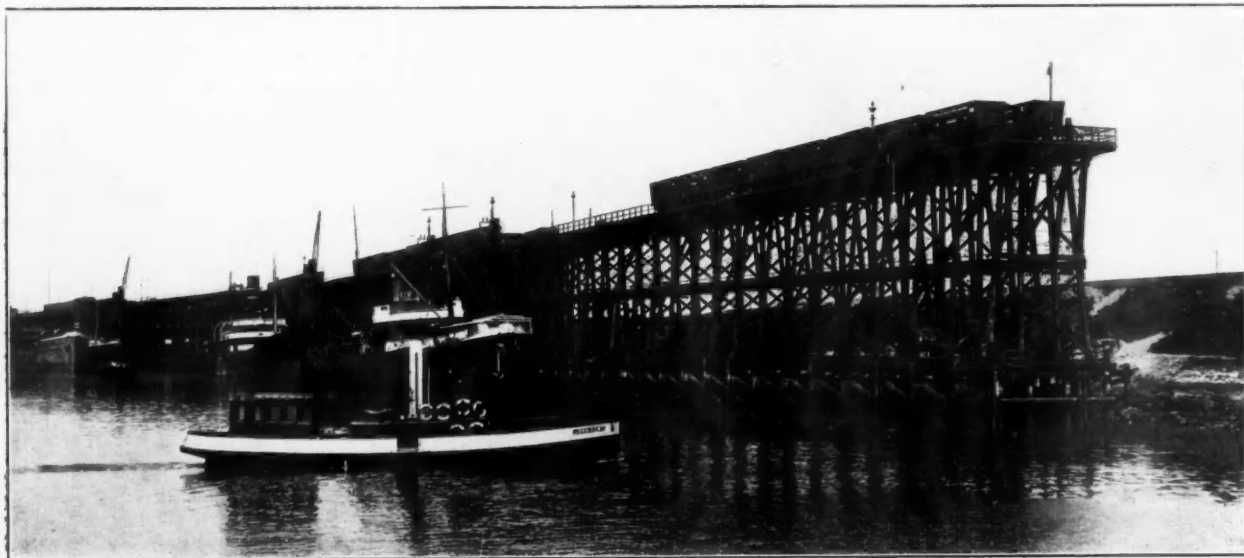


Fig. 2.

The Port of Vancouver, British Columbia



Aerial View of the South Shore of Vancouver Harbour, showing Stanley Park and the Entrance through the First Narrows in the near background.

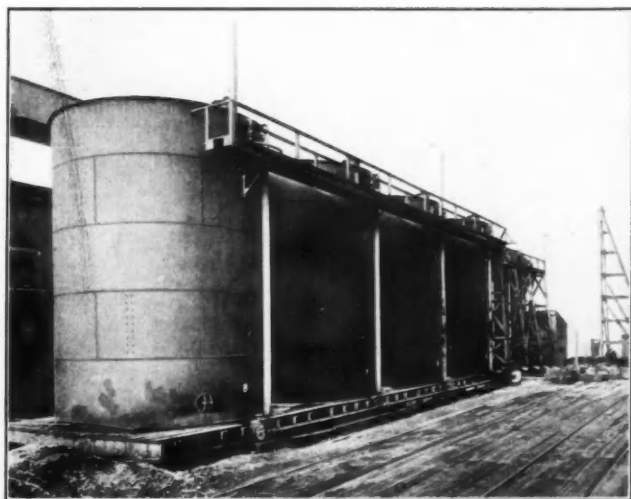
HAD Alexander MacKenzie reached the Pacific a few months earlier, he might have been greeted by the last thing he expected—a two-masted frigate with the colours of his native England floating lazily to the breeze. It was getting late autumn of the year 1792, and Capt. George Vancouver, completing his surveys of the coast, decided to lift anchor and turned the bow of the "Discovery" south for England and home. Early the following summer, completing an epic journey over land, MacKenzie emerged upon the blue Pacific.

This, virtually, is the first link between Canada's Pacific sea coast and the Motherland. For almost a century following the visit of these two emissaries of Britain's eighteenth century

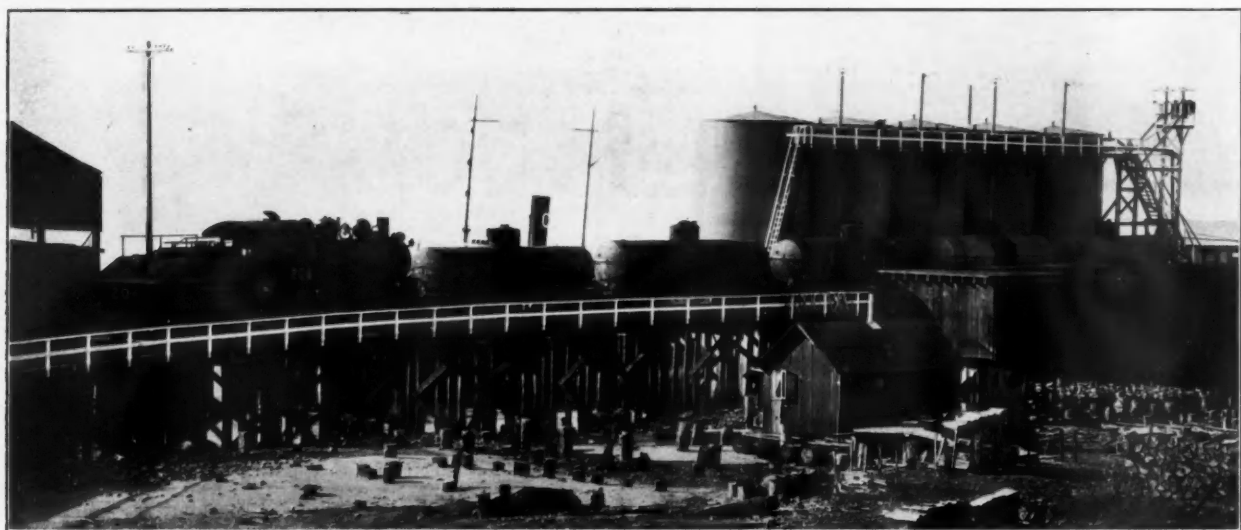
restlessness little occurred to disturb the primitive stillness of these fir-clad shores. Then something happened. In 1887 the Canadian Pacific Railway completed its line to the Pacific, terminating at Vancouver. This event may be said to be the seed of the present city of Vancouver. Compressed within the short span of forty odd years has been the history of a city's phenomenal growth. From a few straggling huts to the present city of 300,000 people, vibrant with shipping and industrial activity, is a long stretch of the imagination. But the transition has been rapid in point of time. Backed by a hinterland richly endowed with natural resources, Vancouver has been the natural evolution of a set of favourable circumstances. Minerals, lumber, fisheries, fruit, wheat—these are but a few of the commodities which flow through the port on their route to world markets. Upon the basis of its shipping, Vancouver has expanded to become an important manufacturing centre, with the whole of the Canadian West as its territory, as well as markets abroad.

The physical aspects of Vancouver's harbour are unusually propitious, both as to natural beauty and adaptability to the demands of practical shipping. The harbour approach is one of the most beautiful conceivable. Forming a spearhead to the city, its preservation a miracle of foresight, the famous Stanley Park lends it a touch of primeval beauty. To the North, strongly defined upon the skyline, the peaks of the Coast Range shelter the port, their crests perennially mantled. Physically, the harbour is divided into three parts. The central or developed part, completely sheltered within the First and Second Narrows, has approximately ten miles of water frontage with a maximum width between north and south shores of $2\frac{1}{2}$ miles. There is good anchorage for vessels handling cargoes in the stream. Along the waterfront on both the north and south shores are piers, docks, grain elevators, lumber mills, meat packing plants, cold storage and refrigerating plants, drydocks and shipbuilding plants, iron foundries, sugar refinery, factories for the manufacture of cans, paper products and various other items. The port is open to navigation all the year round, and at the present time has the largest grain elevator storage of any ocean port in the world.

The Port of Vancouver is served by 21 deep sea steamship lines to Great Britain and Continental ports, and a further thirty lines to the Orient, Australasia, United States Atlantic ports,



Tanks at the Port of Vancouver for Storage of Vegetable, Nut and Wood Oils. Accessible for direct transfer from deep sea ships and transhipment to tank car, these tanks greatly facilitate the passage of oils through the port.

The Port of Vancouver—continued

Tanks for the Storage of Fish Oil, recently installed by the Vancouver Harbour Commissioners, accessible for direct reception from deep sea ships and transshipment to train.

South America and South Africa, as well as two steamship lines to California and 13 lines operating coastwise locally.

The Port of Vancouver additionally is the Pacific terminus of three railways—the Canadian Pacific, the Canadian National and the British Columbia owned Pacific Great Eastern.

The opening of the Panama Canal in 1912 materially influenced the position of Vancouver as an artery in world trade. The all-water route to Europe, reduced to 8,500 miles, became feasible for the first time. Not only did this bring the port large exports out of Western Canada, it also created for shippers in Great Britain and Europe a cheaper route for goods destined for the Canadian West. Discounting the time feature, it was found merchandise shipped through the Panama Canal via Vancouver could be laid down cheaper to points as far East as Saskatchewan.

The Vancouver Harbour Commissioners, alive to the present status and future possibilities of the port, have followed a consistent policy of port development. To the extensive facilities already existing have been added within the past year a number of improvements leading to shipping expediency. Their policy has been one not of specialisation, but of generalisation. At the port the installation of storage tanks has just been com-

pleted, capable of handling 300,000 gallons of fish and vegetable oils, together with pumping facilities which will move 25,000 gallons of oil per hour from ship to tank car.

To cope with the increase of grain shipments it was found necessary to add to the capacity of three elevators a total of 1,615,000 bushels. Additional trackage was provided which will accommodate over 250 grain cars.

An extension of 300-ft. to the Lapointe Pier, commenced last December, is now completed and will provide berthing accommodation for five deep-sea vessels.

Besides its record grain shipments, other exports from Vancouver in 1932 include over 200,000,000 board feet of lumber and logs, nearly 1,000,000 cases of canned salmon, 104,157 boxes of British Columbia apples, over 1,000,000 barrels of flour, 69,105 cases of canned milk, more than 40,000 tons of paper and pulp, 55,000 tons of lead and zinc, 773,866 gallons of fish oil.

The general port equipment includes berths to accommodate 50 deep-sea ships, with depth of water up to 45-ft.; storage sheds on the piers with a total capacity of 1,600,000 sq. ft.; cranes to handle loads up to 100 tons; drydock facilities up to 15,000 tons.

Scottish Harbour Notes

Extension Scheme at Kirkwall Harbour.

Considerable work of an important character is foreshadowed in connection with an extension scheme at Kirkwall Harbour. At a recently held meeting of Orkney Harbour Commissioners a proposal was tabled that on the east side of the main pier the widening scheme should be extended from the deep water quay to the Harbour Office (which is likely to be left on an island site), and this proposal met with general approval. For some considerable time past there has been a growing feeling locally that the time is opportune for an ambitious scheme of harbour extension, and it is felt that the present proposal, if and when carried out, will be a decided boom and blessing.

Leith Docks Development Committee.

A resolution was passed at a recently held meeting of the Leith Docks Development Committee to the effect that the development of the local docks should be made the outstanding question at the forthcoming municipal elections on the ground that this is a matter that concerns all sections of the community. The committee further urged that ratepayers in all wards of the city should bring up this topic with candidates, who should be invited to answer questions as to how they proposed to solve the problem of the development of Leith Docks, and to give an assurance, if elected, that it would be their first concern to have Leith Port made one of the progressive harbours of the country. There was general agreement among the members that there was ample evidence to disprove statements in a report to the Edinburgh Corporation and to show that the conditions at the Port of Leith are not receiving the urgent attention required.

Dealing with the subject of the prosperity of the Port of Leith, a letter recently appeared in a local newspaper from a well-known citizen strongly urging that the Treasury should give the wherewithal to modernise a port which used to hold the proud position of being one of the recognised shipping *entrepôts* of the United Kingdom. This writer further urges the importance of dock improvement in connection with transport economies, and he stresses the point that the commercial community as a whole must be cognisant of the deleterious effect that the retrogression of the port is having upon local prosperity. He further adds that the bigger the ship the more economic it is to run, and that lines constructing or having such tonnage will not come to a port which cannot give adequate service or quayage, as, he contends, is the case meantime with the port in question.

Immingham Dock Statistics

During the month of September a total of 110 vessels, representing a net registered tonnage of 132,602, used Immingham Dock, including 24 vessels totalling 28,540 net registered tons using the Western Jetty coaling berth and one vessel of 9,810 n.r.t. engaged on a passenger cruise, as compared with September, 1932, when a total of 105 vessels, representing 147,721 n.r.t., used the port, including 19 vessels totalling 31,303 n.r.t. using the Western Jetty.

Notes from the North

Bridge Weights at Liverpool.

REPRESENTATIONS have been made to the Mersey Docks and Harbour Board by the Merseyside transport associations urging an amendment of the regulations governing the permitted bridge weights on the Liverpool floating roadway. The gross laden weights of vehicles allowed on the Liverpool floating roadway are in most instances below those permitted on the highways by the regulations issued under the Road Traffic Act, 1930:—

Floating Roadway.—General vehicles: motor 12 tons gross, axle weight 9 tons; trailer 6 tons gross; total gross, 18 tons. A trailer load of 12 tons (axle weight 9 tons) is permissible if drawn by a tractor not exceeding 6 tons gross.

Road Traffic Act.—General vehicles: motor 12 tons gross, axle weight 8 tons; trailer, 10 tons gross, axle $6\frac{1}{2}$ tons; old steam wagon, 14 tons gross, axle 9 tons; trailer 8 tons gross, axle $6\frac{1}{2}$ tons; new steam wagons on pneumatic tyres, 18 tons gross, axle 9 tons; trailer 9 tons gross, $6\frac{1}{2}$ tons axle; total gross, 22 tons.

The motor and trailer combination has been taken as the example, as it is the class which, it is contended, would permit of an increase in the gross weight without adversely affecting the safety hazard.

The Dock Board has been asked to concede an increase of 4 tons in the gross weight of trailers drawn by motor vehicles. A proviso has been suggested that the combined weight shall not exceed that laid down in the Road Traffic Act, viz., 22 tons.

The average motor and trailer combination covers a length of approximately 45-ft., with an average distance between the platform edges of the two vehicles of 4-ft. 6-in. to 5-ft. Under the bye-laws of the Dock Board the total weight of such combination when on the bridge must not exceed 18 tons. On the other hand, two solo motor vehicles in rank covering the same are permitted a total of 24 tons (12 tons each).

The Dock Board has been asked to take into account the following important factors in considering this request:—

In the first place, motor vehicle owners are due to pay heavy increases in licence duties as from the 1st January next. To meet these new taxes, owners will be compelled to extract the highest possible revenue from their transport, and in the case of vehicles crossing the Mersey the existing weight restriction over the floating bridge will constitute a much more serious handicap under the new conditions than they do at present.

Further, under the prospective Road and Rail Traffic Act, it will be a condition of licensing that operators must conform to the weights regulations of the Road Traffic Act. Any operator who habitually ignores these regulations will run the risk of losing his traffic licence. With this possibility constantly in mind, therefore, operators are not likely, it is contended, to abuse any concession the Dock Board may make to bring their limit up to that of the Road Traffic Act.

Preston's Big Cargoes.

Preston Docks recently received an exceptionally big cargo of about two million feet of Quebec spruce. Bigger cargoes have been discharged recently, but probably never before, as far as Lancashire is concerned, has so much 3-in. by 2-in. section spruce, amounting to 1,400,000-ft., been brought ashore.

Progress of Mersey Tunnel Work.

The engineers' report of the progress made on the new Mersey Tunnel, presented to the October meeting of the Tunnel Committee, states that £4,610,250 of the work had been completed, and that at the moment 425 men were employed.

The construction of the reinforced concrete roadway and other interior concrete in the circular cast-iron lined tunnel under the river, of which the contract amount was £384,884 0s. 9d., the estimated value of the work accomplished was £395,000, or 103 per cent. The fixing of the dado was being continued, and 9,100-ft. or 88 per cent. had been fixed. The interior finish was complete, and 5 per cent. of the laying of the cast-iron roadway done. Cable laying was being continued, and in all 50 men were employed. The ventilation fan, driving gear and electrical equipment, electric cables, carbon monoxide analyses contracts were making good progress, while the contract for the electric lighting fittings was completed. Good progress had also been made on the contract for telephones and fire alarms. The total value of engineering work on the various contracts was: Headings, £643,582; river tunnel, £1,478,368; Birkenhead tunnels, £944,000; Liverpool tunnels, £711,000; river tunnel roadway, £395,000; ventilation works, £241,000; Walker fans, £24,000; Sturtevant fans, £15,000; lighting fittings, £5,200; driving gear and electrical equipment, £78,000; retaining walls, George's Dock, £34,000; electric cables, £20,100; Woodside foundations, £21,000; total, £4,610,250.

Ribble Dock Undertaking.

In the five months April to August there has been an increase of £11,000 in the traffic receipts of the Ribble Dock undertaking.

Port of Manchester Industries.

Three companies closely connected with the facilities for industrial and commercial activity at Trafford Park, Manchester, have issued their annual reports and accounts. Trafford Park Cold Storage, Ltd., which is controlled by Trafford Park Estates, Ltd., reports a profit of £2,412, as compared with a loss of £1,670 for the previous year. Port of Manchester Warehouses, Ltd., increased its profit from £6,394 for 1931-2 to £7,058 for the year just ended. The profit of Grain Elevator Estate, Ltd., was slightly lower at £8,186, against £8,334 for 1931-2.

Dock Board Retirement.

At a recent meeting of the Mersey Docks and Harbour Board it was announced that Mr. Christopher Concannon, who for over 48 years has been in the service of the Board, for 14 years outdoor assistant to the general manager, will retire on superannuation on November 7th.

Wallasey Sea Defence Wall.

Wallasey Council is to proceed with the extension of the sea wall and promenade from the Red Noses to Harrison Drive. This is part of the second half of the £1,000,000 development scheme, and after the matter has been before the Finance Committee the Council will be asked to decide. On the first portion of the work, which is now just finishing, 250 men or more have been at work. The present sea wall will be continued to Harrison Drive, also the promenade will be extended, and there will be sunken gardens, tennis courts, bowling greens and miniature golf courses. A large portion of land will be reclaimed and will be in the market for building purposes.

Dredging Crossens Channel.

Good progress is being made with the work of dredging the Crossens Channel. At the last meeting of the Crossens Catchment Board it was stated that 32,000 cub. ft. of material had been excavated from the bed and sides of the Channel, which represented the major part of the excavation to be carried out under the loan sanction, after which there remained only a short length of the main excavation to be done in the narrow portion of the Channel, and then the spread on the banks of spoil excavated. It has been found necessary to have steel sheet piles driven in the northerly bank for a length of about 100 yards so as to prevent slips damaging the bank or the adjoining cart road, and it will probably be necessary for a certain amount of sheet piling to be done on the northerly side of the short channel which conveys the three brooks into the main channel.

The next work to be proceeded with will be the New Cut at the seaward end of the work already done, and also dredging of the internal rivers. If the Board decides to proceed with further work, the engineer suggests that the following work should be undertaken at the estimated cost shown: New Cut, £4,702; Main Rivers—half estimated cost of total works, £13,800; total, £18,502.

Ship Canal Dredging Department.

Mr. John Forbes, who has just retired from the position of superintendent of the dredging department, after having been in the service of the Manchester Ship Canal Company for 46 years, was presented by Mr. J. Martin, the resident engineer of the Ship Canal Co., with a wallet of notes. At an early age Mr. Forbes worked with his father, who was a constructional contractor, and for a period was engaged in the South of England. He saw the first sod cut at Eastham, and the canal completed, and he has been in the service of the company since. For the major portion of his service he has been in charge of the dredging of the canal from Bromborough to Warrington.

When the canal was first made, its depth was 26-ft., but during Mr. Forbes' time an important development was undertaken, the canal being further deepened to 30-ft. from Eastham to Warrington, and 28-ft. from Latchford to Manchester. This work was carried out entirely by dredging, and took between three and four years. Mr. Forbes can speak of the remarkable advance made in equipment during his connection with dredging. In the early years, rock had to be blasted by explosives. This meant the drilling of a hole several feet deep, the inserting of explosives down a steel tube and the using of a slow fuse for ignition. To-day the rock drill has replaced that system, and there are dredgers fitted with machinery that remove sand and clay without difficulty.

Notes from the North—continued

Pensioned Off.

Wallasey Corporation has decided to sell the 25-year-old Mersey ferry steamer, the "Royal Daffodil." Probably she will be allotted a new sphere of usefulness. Her sister ship, the first "Royal Iris," sold about two years ago, is at present carrying on bravely in running pleasure cruises from Dublin, and no doubt the "Daffodil" will be put to some such work.

Now there has arisen the question of whether the retired vessel should be replaced by a new steamer, thus maintaining the ferry service at strength. At the present time the Ferries Committee have six passenger steamers at their command, two of which were built in 1910, viz., "John Joyce" and "Snowdrop." Should anything happen to prevent any of these vessels from taking their place, the running of the service would be seriously jeopardised. The ferries' finances were never in a sounder condition than now, all the recent additions to the fleet, the new luggage steamer, "Royal Iris II.," and the recently added coal barge, being financed out of revenue without a single penny being added to the general district rate.

Birkenhead Fish Dock Project.

A further attempt has been made at Birkenhead to secure the discussion of a project for converting a section of the docks for the use by fishing trawlers and the conversion of a dock shed for use as a wholesale fish market. This matter has already been considered on the Liverpool side of the River Mersey and turned down. Birkenhead Chamber of Commerce, after examining the matter, decided similarly. Mr. J. Shaw, chairman of the Commercial Development Section of the Birkenhead Chamber of Commerce, said a lot of confidential information had been obtained as to the movement of fish throughout the country, and they had also made an examination of the plans with regard to the Fleetwood fishing port. Data was obtained as to lay-out and cost, and, after full consideration, the Section came to the conclusion that the proposal to establish a fish market at Birken-

head was outside the range of practical politics. An enormous amount of money would have to be expended to make Birkenhead anything like a modern fishing port, and even then they would have to get support of the trawler owners as well as the fish merchants. The proposal was turned down.

Incidentally, it may be relevant at this point to mention that one of the political parties at Liverpool has made the fish dock idea a point in its election programme. No useful purpose can be served by resurrecting the matter, as both the Mersey Docks and Harbour Board and the City Markets Authority have already made a thorough investigation and are not impressed by the possibilities of Liverpool as a fishing port, having regard to the enormous capital expenditure that would be involved and the doubtful results that would accrue.

Ship Canal Traffic.

Manchester Ship Canal Company's monthly approximate traffic return for September reveals that receipts from the main waterway were £76,080, or £12,120 less than those for the previous month, though £5,053 more than those for September, 1932.

The September figure brings the total for the first nine months of the year up to £828,579, and reduces the decrease in the total as compared with that for the corresponding period of 1932 to £13,854. The decision of Lobitos Oilfields, Ltd., to erect a crude oil refinery at Ellesmere Port has been hailed with satisfaction. A site which will permit of the extension of the refinery, should result warrant such a course, has been acquired near Stanlow Oil Docks. The products of the company's Peruvian oilfields will be handled here. Recently, it may be recalled, a second oil dock was opened at Stanlow. The main installations of the various oil companies in this district cover an area of about 200 acres, and there is more land available for developments. Cargoes of petroleum spirit and other dangerous fluids flashing below 73 deg. F., also petroleum, lubricating and other oils, are discharged at Stanlow.

Bombay Port Trust

The Port Trustees, at their meeting held on the 26th ult., considered a number of representations from the cotton, grain and iron merchants on their roll of tenants for a reduction of rentals in consideration of (1) the effect on local trades and industries of the prolonged economic depression and the increased competition from other ports, and (2) the general depreciation in property value and consequent inducement to merchants to transfer their tenancies to plots and buildings available at cheaper rates outside the Port Trust boundary. The chairman, in his report on the subject, observed that, in certain specific industrial cases, the Trustees had already granted relief, but that consideration of any general scheme had been deferred for financial reasons. In view of the improvement in the general revenue position since the opening of the year, he was of opinion that, in the interests both of the Trust and its tenants, the position should now be reviewed as a whole. At a time of world-wide trade depression it was, he submitted, the primary duty of the Trust, as an important landowner, to study the needs of local trades and industries and to lighten, as far as practicable, the burden of rent charges on its own tenants—a policy which would tend to popularise the Trust's estates and reduce vacancies, the ratio of which in certain of the depôts had lately been increasing. He pointed out that the Trust had some 400 acres of industrial land available for letting. The report reviewed in detail the financial history of the various estates, the economic basis on which the existing rents had been calculated, the anticipated reduction in the economic return, consequent on reduction of debt charges through repayment or conversion of the relative capital loans, and the anticipated financial effect of a percentage reduction in all monthly, seasonal and other temporary occupations of Port Trust lands and buildings, with the exception of staff quarters and plots leased for recreation or other similar purposes at a nominal rent. The present annual revenue from the properties under review was stated to be Rs.24,59,000.

After full consideration the Trustees approved a general remission of 10 per cent. on the existing rates with effect from October 1st, 1933. In the case of tenants willing to deposit 12 months' rent in advance, a further remission of 5 per cent. will be granted. In the case of the Port Trust godowns at the cotton depôt, where the basic rate has been fixed at Rs.500 a month, and the Ryan Grain Market, the remission is to be at the rate of 15 per cent., with a further remission in the case of tenants depositing a year's rent in advance, the rate of which will be decided by the Trustees after ascertaining the number of tenants desirous of taking advantage of this further concession. A rebate of 25 per cent. on the present jetha rents was agreed to, subject to stacking being restricted to 8 bales high.

The rents of the open-sided jetha sheds were fixed at Rs. 300 a month, less 15 per cent., and subject to the same restriction. A proportionate scale was sanctioned for half godowns and casual lettings of less than one month. The remissions will be reviewed annually and will throughout be subject to the condition that all rent is punctually paid. The estimated maximum cost of the remissions, calculated on present occupancies, is about Rs. 4 lakhs per annum, but with a return to normal trading conditions and consequent reduction in the ratio of vacancies, this figure will become correspondingly less.

Irish Harbour Matters

Dublin

Dublin Port Sanitary Authority.

At the October meeting of the Dublin Port Sanitary Authority, held in the Municipal Buildings, Dublin, Alderman J. Hubbard Clark presided. The Port Medical Officer reported that 107 vessels entered the Port of Dublin during September. Of these, 43 were of foreign nationality, and no case of infectious disease was detected on or reported from any of these vessels. There were seven tons of second-hand clothing and rags subjected to the process of disinfection. The report also stated that seventeen dead rats were found aboard one vessel after fumigation.

Free State Ports and the "Economic War."

Mr. Lemass, Minister for Industry and Commerce in the Irish Free State, has stated in the Dail (or Free State House of Commons) that Harbour Boards which derived most of their revenue from British imports, but have now lost that trade as a result of "the economic war," will not receive any State assistance. He did not think that any port was entirely dependent on British shipping, and suggested that where revenue had declined the scale of charges by such Boards should be revised.

The Minister was reminded that where the trade of a port was completely lost an alteration in the scale of charges would not remedy matters.

Donegal

Donegal Port Scheme.

There is great satisfaction among the people in the district at the decision of the Free State Government to establish a deep sea port in Co. Donegal. This has directed attention to Killybegs, a land-locked harbour on the north shore of Donegal Bay. It is entered from the sea through a wide, deep channel, with deeper water inside the harbour, right up to the sea wall. At this wall there is a depth of almost 30-ft. at ordinary spring tides.

North-East Coast Notes

Trade on the Up-grade.

IT is a long time since reports of a more satisfactory character were submitted to a meeting of the Tyne Improvement Commission than those placed before the Board in September. For long there had been a wearisome succession of decreases, but at long last the tide had really turned, and the figures which covered the months of July and August showed distinct improvement. The total shipments of coal and coke for the two months named were 2,174,467 tons, compared with 1,897,148 tons, an increase of 277,319 tons. Still more pleasing was the fact that for the eight months of this year the total of 8,370,396 tons indicated an increase of 86,775 tons when compared with 1932, or something slightly more than 1 per cent. Having regard to the smallness of the shipments in the earlier part of the year, it is perfectly plain that very considerable headway had been made. Nor was the improvement limited to fuel shipments, although, of course, these are of prime importance to the river, the report on the business done at the Commissioners' Docks and shipping places was of a similar satisfactory character. During the months of July and August, 470 vessels had been despatched, an increase of 111 on 1932, while the merchandise handled at 38,442 tons was an increase equal to 61.47 per cent. For the eight months the increase was equal to 1.71 per cent. Petroleum spirit imported was also larger by 11,900 tons during the past eight months. Other statistics which gave cause for satisfaction were those in regard to idle ships in the river. At the end of July they numbered 130 representing 269,616 tons net register, but at the date of the meeting they were down to 116 vessels of 257,000 tons.

Cause for Satisfaction.

Mr. R. S. Dalgliesh, speaking at the meeting, said there was a note of satisfaction to be derived from the trade figures. There was something more satisfactory than a mere increase in the figures; month after month a fall in the export trade had had to be reported. July and August, however, had brought a material change. The export figures crept up, and it was a fairly substantial increase in that side of their shipments which had brought about the general increase they had to record. "The home trade," he added, "has more than maintained last year's volume. In that there is cause for satisfaction, but I think it is greater satisfaction to find our overseas shipments improving. That is at once an indication of expansion of international trade."

New Tyne Anti-breakage Plant.

The Tyne Commissioners have decided to proceed with a £4,000 scheme for an additional coal anti-breakage appliance of the Handcock type for No. 4 Staith at Whitehill Point, and the Board has accepted a tender of £3,475 from Messrs. F. Turnbull and Co., of Newcastle, for the construction and erection of the appliance. The laying of the necessary foundations and the lengthening of the hanging spouts will be carried out by the Commissioners' engineer and his staff at an estimated cost of £700.

Mr. R. S. Dalgliesh (chairman of the Docks and Trade Committee), at the September meeting of the Commission, pointed out that since the war, and especially during the last few years, a great change had come over the marketing of coal. Buyers, especially foreign buyers, demanded delivery of coal in a much better state than was acceptable in pre-war days. Collieries had, at a heavy cost on their side, met requirements by grading and cleaning; something, however, was also called for from those who provided the facilities for shipment, and it was the duty of port and dock authorities to assist the coal trade as far as it might be possible to meet the changed requirements of the trade. He added that the additional anti-breakage plant was asked for by one of the largest shippers of Northumberland coal on the Tyne, the Backworth Collieries, Ltd. The terms were satisfactory from the Commissioners' standpoint.

Sir Arthur Sutherland informed the meeting of the Commissioners that a committee had gone into the question of developing Jarrow Slake. It had been decided to adjourn the matter until a later date, but he gave an assurance that the question would be returned to by the Committee without undue loss of time. Sir Arthur explained that the meeting held by the committee was of a more or less preliminary character, though they had before them figures and details of new development proposals.

Records of Expeditious Work.

Smart work in the North continues to be recorded, and three instances may here be noted. The tribute of Messrs. Crosby,

Son and Co., of West Hartlepool, may appropriately come first, seeing that they state: "We have a North-country river, the Tyne, ranking second to none in her own specialised activities." Then they give the log of the s.s. "Ousebridge," 10,400 tons d.w., as follows: Passed inwards, 3.15 p.m. September 28th, berthed Commissioners' staiths 4 p.m., commenced bunkering 5 p.m., completed bunkering 11.45 p.m., passed out 2.40 a.m. September 29th. The bunkers shipped totalled 1,028 tons, the whole of which, except 270 tons, necessitated heavy trimming.

Another instance of quick loading comes from Tyne Dock. The steamer "Cromarty," owned by Messrs. B. J. Sutherland and Co., Newcastle, began loading on September 11th at 6 a.m., and by 10 p.m. on September 12th had taken on board 8,200 tons of coal and 900 tons of bunkers, all accomplished in 40 hours.

A new record in dock crane loading was set up at the London and North-Eastern Railway Co.'s dock at Middlesbrough at the end of September, when the s.s. "Somali" took on board 2,000 tons of general cargo. The vessel arrived at Middlesbrough at 1.37 a.m. on the 23rd September; work commenced at 6 a.m. and finished on the Monday (25th) at noon. Between 6 a.m. and 4 p.m. on Saturday ten cranes were working simultaneously, and merchandise was handled at the rate of 16.07 tons per hour.

Blyth Development.

In order to provide additional facilities for shipping, Blyth Harbour Commissioners have decided to enlarge the tidal basin at Cambois at a cost of £50,000. A retaining wall to cost £20,000 is to be constructed by Sir Robert McAlpine and Co., and the Commissioners will carry out the excavating work, which is to cost £30,000. About five acres of land is to be excavated to provide berths for 14 vessels.

At the September meeting of Blyth Harbour Commissioners the chairman, Mr. Ridley Warham, referred to the death of Mr. John Easton, who was the second clerk to the Commissioners, having succeeded Mr. John Laws. Mr. Easton commenced with the Harbour and Dock Co. in 1875, and had been clerk to the Commissioners for 26 years. The chairman gave details of the coal shipments for the eight months of this year, the figures being: 1933, 3,574,682; 1932, 3,082,018 tons; 1913, 3,152,175 tons. These totals represent an increase of 16 per cent. on 1932 and 13 per cent. on 1913.

Tyne and Wear F.O.B. Prices.

The dispute which has lasted for a considerable time between the Tyne and Wear as to the f.o.b. prices for coal is in fair way to being settled. At the time of writing it was reported that the threatened action at law over the question had been averted. After the marketing scheme under the Coal Mines Act of 1930 began to operate in January, 1931, all shipping charges on the Wear were included in the f.o.b. prices of the coal, it was alleged that this caused a differentiation of 1½d. per ton in favour of the Wear, and a considerable amount of trade was diverted from Tyne Dock to Sunderland. In the early part of last year the Tyne Commissioners and other parties concerned complained of this differentiation to the Durham Investigation Committee, and upon the finding of that body the Durham Executive Board directed that the collieries shipping in the Wear must add 1½d. per ton to the price of the coal. The Wear collieries most directly concerned challenged this decision and were prepared to test it in the Law Courts, but it is stated that a provisional settlement has been made by the parties whereby the Wear shipping collieries will charge the scheduled minimum f.o.b. prices, but the collieries shipping in the Tyne will be allowed to pay Tyne dues out of the minimum prices.

Cargo Handling at Bristol

A vessel regularly trading with Bristol, arrived at that port recently and put up some remarkably fine discharging and loading figures. She was the "Bristol City," built in Bristol and owned by the Bristol City Line (Messrs. Charles Hill and Sons), and on a regular run between American and Canadian ports and Bristol.

She commenced discharge of a very varied cargo, including timber, at noon on Thursday, August 24th, and after discharging, immediately loaded china clay and generals, and was ready for sea again by 4 p.m. on Saturday, 26th, or 26 working hours. The total cargo discharged and loaded was 2,950 tons.

The Port of Ancona



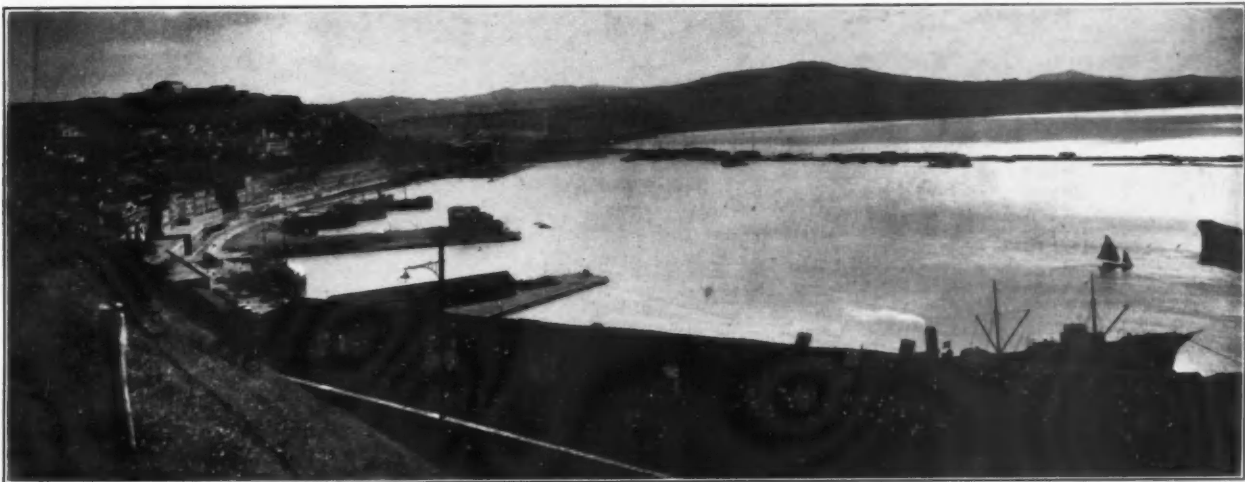
General View of the Port of Ancona.



Construction of the New Port in Progress.

The Port of Ancona and its Development

By ANTONIO GIORDANO



Another View of the Port of Ancona.

FROM an historical point of view the Port of Ancona can trace its existence a long way back in the Middle Ages, when the Republic of Venice dominated the Adriatic and the Levant, though traces of the town also exist in the history of the Roman Empire. During this early period Ancona was under the domination of the Popes and the harbour was completely neglected. It is only since 1870 that consideration has been given to the question of harbour facilities in the Port of Ancona, which used to be and still is the only safe anchorage existing on the whole Italian coast from Venice to Brindisi. This fact raised the importance of the Port of Ancona before the war. The development of trade at Ancona has been facilitated by the prosperity of the industries in its hinterland (paper factories, etc.) and by the geographical position of the harbour laid on the theoretical line running from Warsaw and Budapest to Rome *via* Zagreb, Fiume and Ancona. It should be con-

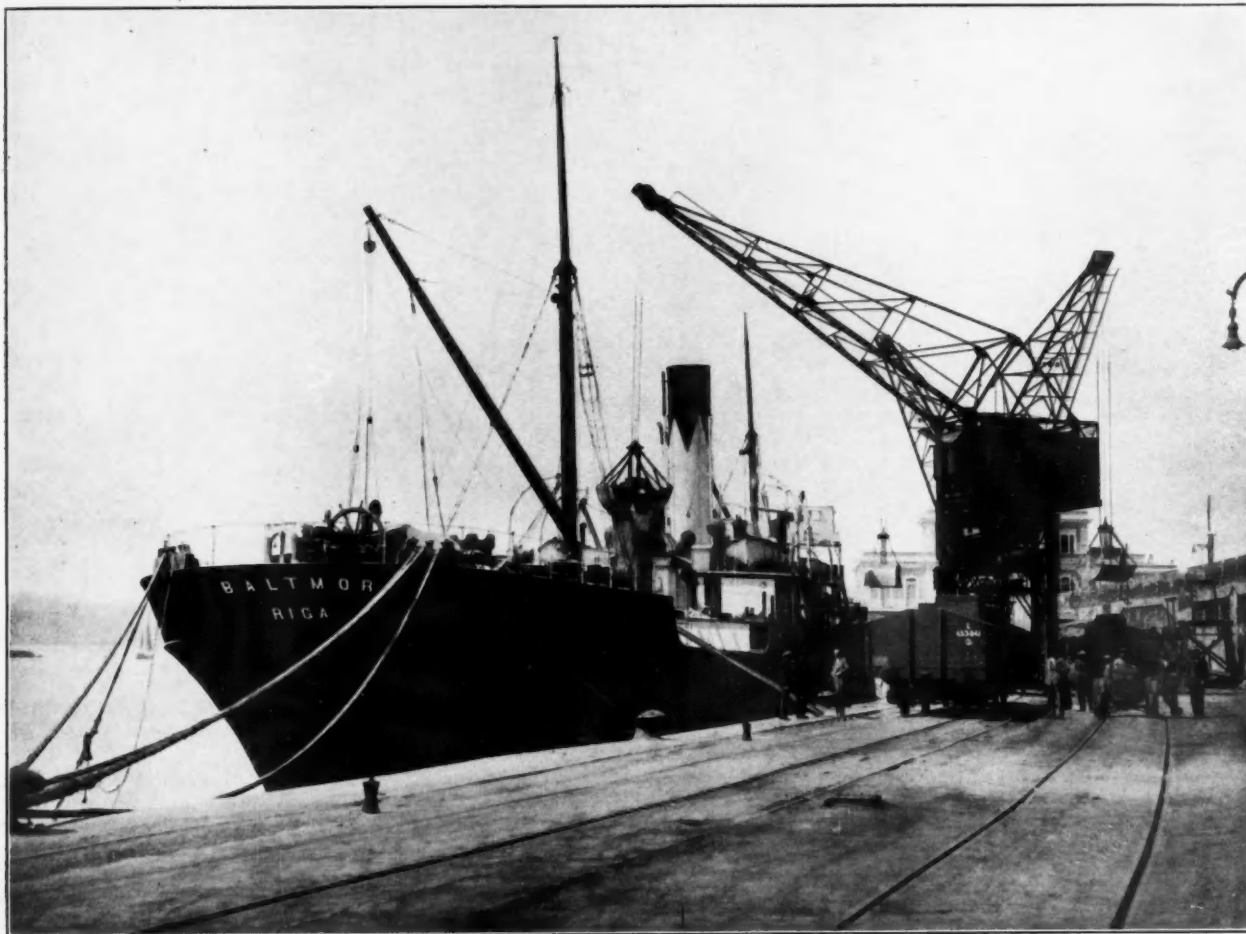
sidered that while the trip from Fiume to Rome takes about 17 hours, the trip *via* Ancona could be reduced to something like 12 or 13 hours.

An idea of the extent of trade handled at the Port of Ancona can be had by examining the following figures relating to shipping at that harbour during the past few years:—

	No. of Ships	ARRIVING Net. Reg. Tonnage	Goods Unloaded Tons	No. of Ships	DEPARTING Net. Reg. Tonnage	Goods Loaded Tons
1913 ...	—	—	780,222	—	—	133,448
1927 ...	1,420	1,125,000	749,000	1,417	1,113,000	21,000
1928 ...	1,517	1,327,000	654,000	1,521	1,323,000	29,000
1929 ...	1,438	1,209,000	523,000	1,436	1,213,000	59,000
1930 ...	1,459	1,271,000	646,000	1,458	1,231,000	63,000
1931 ...	1,425	1,163,000	473,000	1,425	1,425,000	64,000
1932 ...	1,764	1,327,000	269,000	1,771	1,771,000	81,000



The Quay used for the Coal Trade.

The Port of Ancona and its Development—continued*Unloading Phosphates on the Main Quay.*

It will be seen that imports have dropped during 1932 to practically one-third of what they were before the war, while exports through the Port of Ancona have shown an increasing tendency which has been uninterrupted since 1927, though these figures are considerably less than those for 1913.

*General view of the shops in the shipyard of the Cantieri Navali Riuniti S.A. of Genoa.*

The reason for the decrease in imports at the Port of Ancona since the war is chiefly due to (1) the Candiano Canal, which connects the Port of Ravenna to the Adriatic, being made accessible for cargo boats of 8,000 tons, and that Ravenna is much nearer than Ancona to the important industrial and agricultural district of Bologna, etc.; (2) harbour facilities have been built at Pescara, Termoli, etc., and (3) the improvements in the Port of Civitavecchia, which have attracted a large share of the coal imports which used to go through Ancona to the Terni Steel Works situated in the hinterland of the port. On the other hand, the fact that Italy has been assigned with the province of Zara and other small islands in Dalmatia, and that Ancona is the nearest Italian harbour to these territories, which are receiving all their supplies from Italy, has led to an increase in exports from Ancona in the course of the past few years.

The main items of goods imported at the Port of Ancona during the past few years are outlined in the following figures:—

		1932 Tons	1931 Tons	1930 Tons	1929 Tons
Coal ...	...	140,583	266,546	410,784	378,374
Cereals ...	...	138,234	46,781	35,830	24,298
Phosphates ...	...	9,276	31,185	64,226	53,557
Lumber ...	...	8,008	9,993	5,179	1,837

Coal imports have been showing a decreasing tendency as well as the quantity of phosphates unloaded in the Port of Ancona. The decline in imports of phosphates is chiefly due to the situation of agriculture and to the larger use of chemical fertilisers, the output of which is increasing from year to year in Italy. As soon as industry resumes its regular output, traffic at Ancona should at least return to the pre-war figures, in spite of the competition of other Adriatic ports.

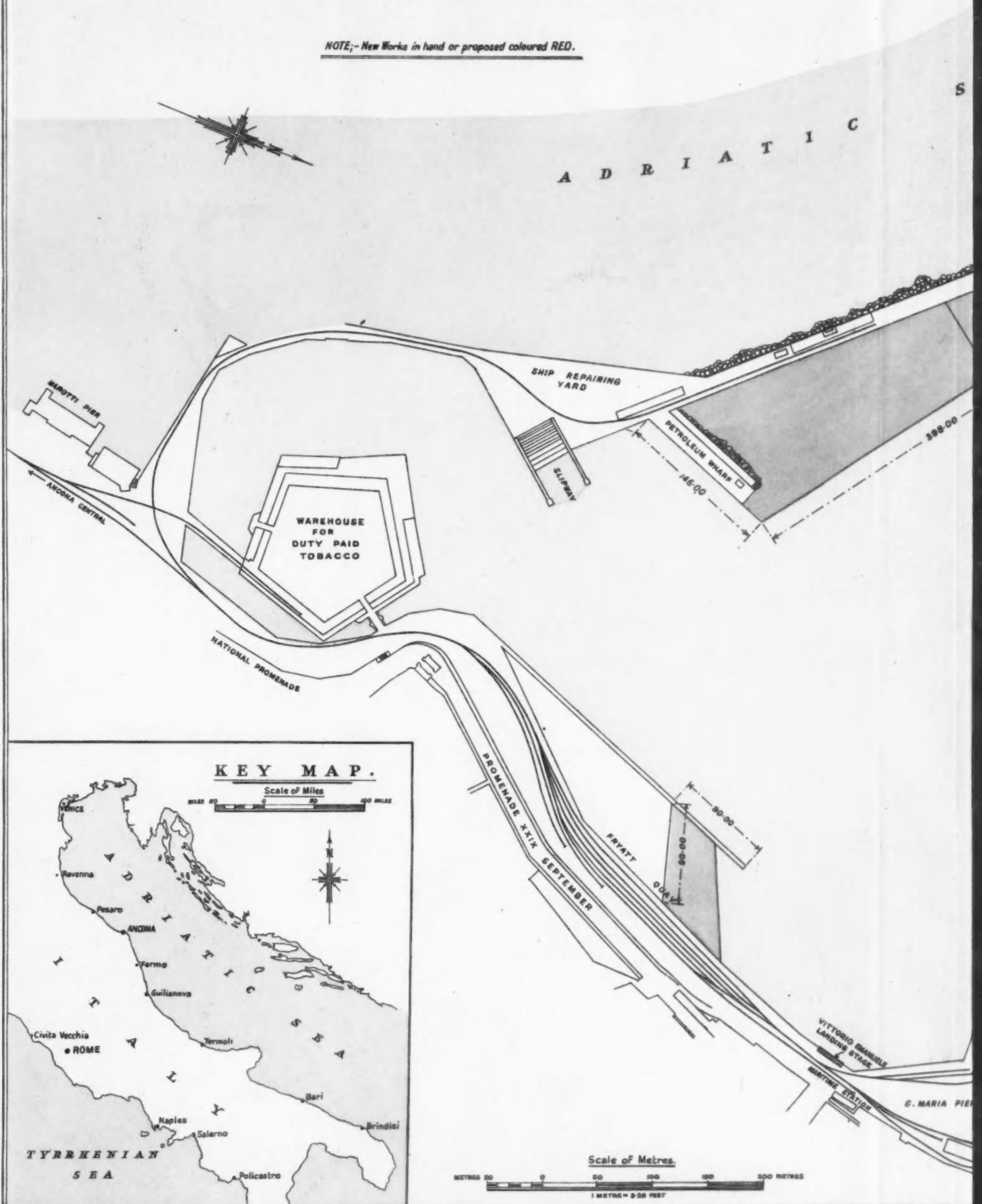
The Port of Ancona is visited by a large number of foreign vessels, and some idea of the importance of the Port of Ancona from this point of view may be had from the following figures regarding the participation of the various flags to the traffic at that port during the last two years:—

Flags	1931			1930		
	No. Steamers and Motor Vessels	N.R.T.	Goods Unloaded	No. Steamers and Motor Vessels	N.R.T.	Goods Unloaded
Italian ...	1,005	981,835	256,004	1,069	1,078,792	381,574
German ...	4	4,244	475	9	11,913	7,036
Norwegian ...	12	18,421	11,159	13	18,402	7,391
British ...	18	30,467	17,751	18	24,908	16,382
Greek ...	29	57,114	81,446	33	63,389	118,353
Panaman ...	2	4,592	5,651	—	—	—
Jugoslavian ...	22	37,671	61,761	21	29,796	54,642
Dutch ...	2	1,821	1,428	4	6,951	13,834
Danish ...	1	1,206	3,138	1	1,511	3,400
Spanish ...	1	1,712	3,256	2	3,411	6,957
Portuguese ...	1	865	—	—	—	—
Lettish ...	1	1,746	—	—	—	—
Egyptian ...	1	1,675	1,060	—	—	—
Roumanian ...	1	1,699	1,533	2	4,259	2,075
Swedish ...	1	2,353	2,959	1	1,615	811
American ...	—	—	—	2	6,230	1,700
Finnish ...	—	—	—	1	1,956	4,377
Russian ...	—	—	—	1	1,286	3,081
French ...	—	—	—	1	1,904	2,598
	1,101	1,147,471	447,621	1,178	1,256,323	624,411

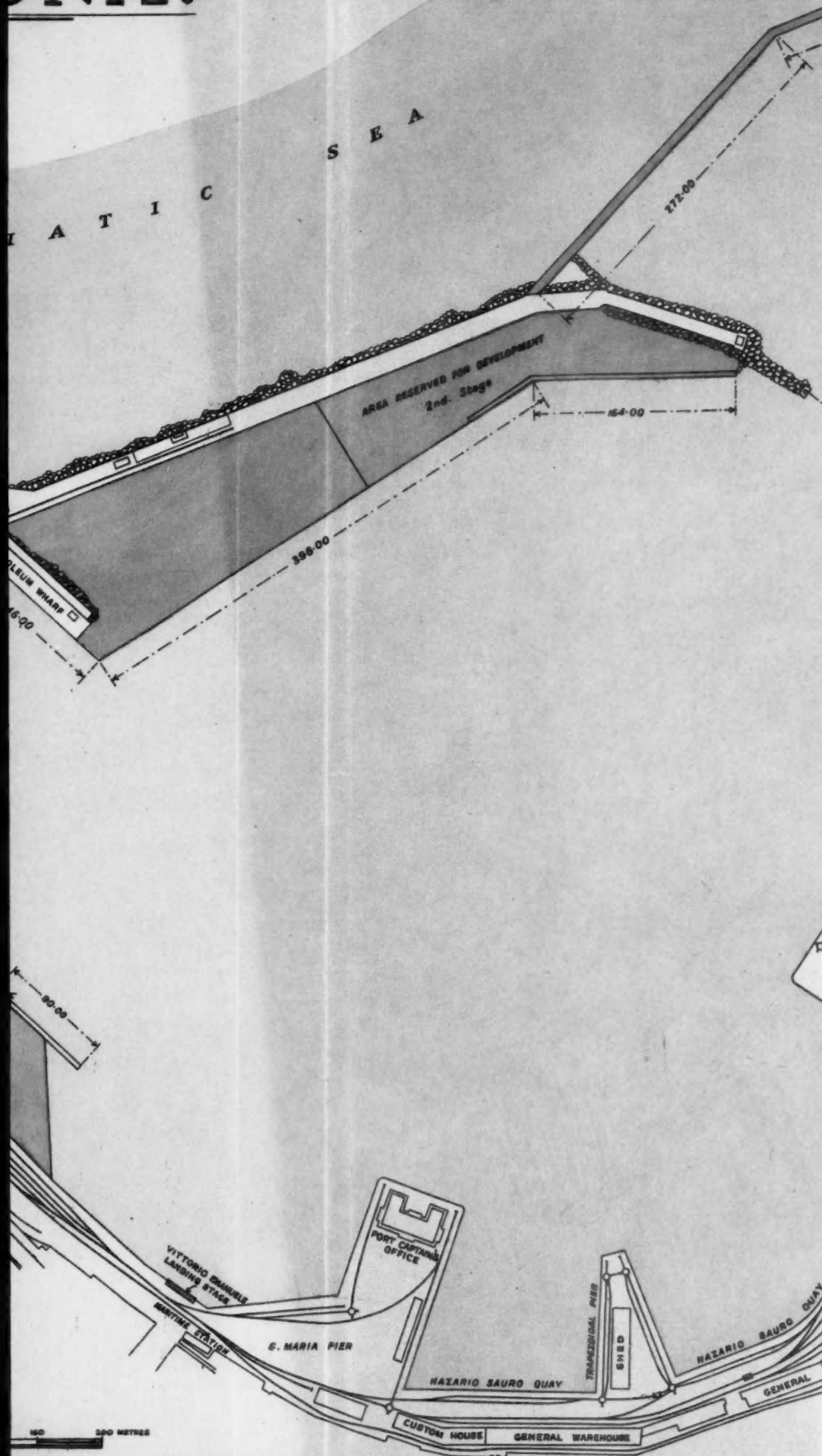
The large quantity of goods unloaded from Greek and Jugoslavian boats is due particularly to the large imports of coal into the Port of Ancona. The participation of the other flags refers especially to the regular steamship services calling at the port,

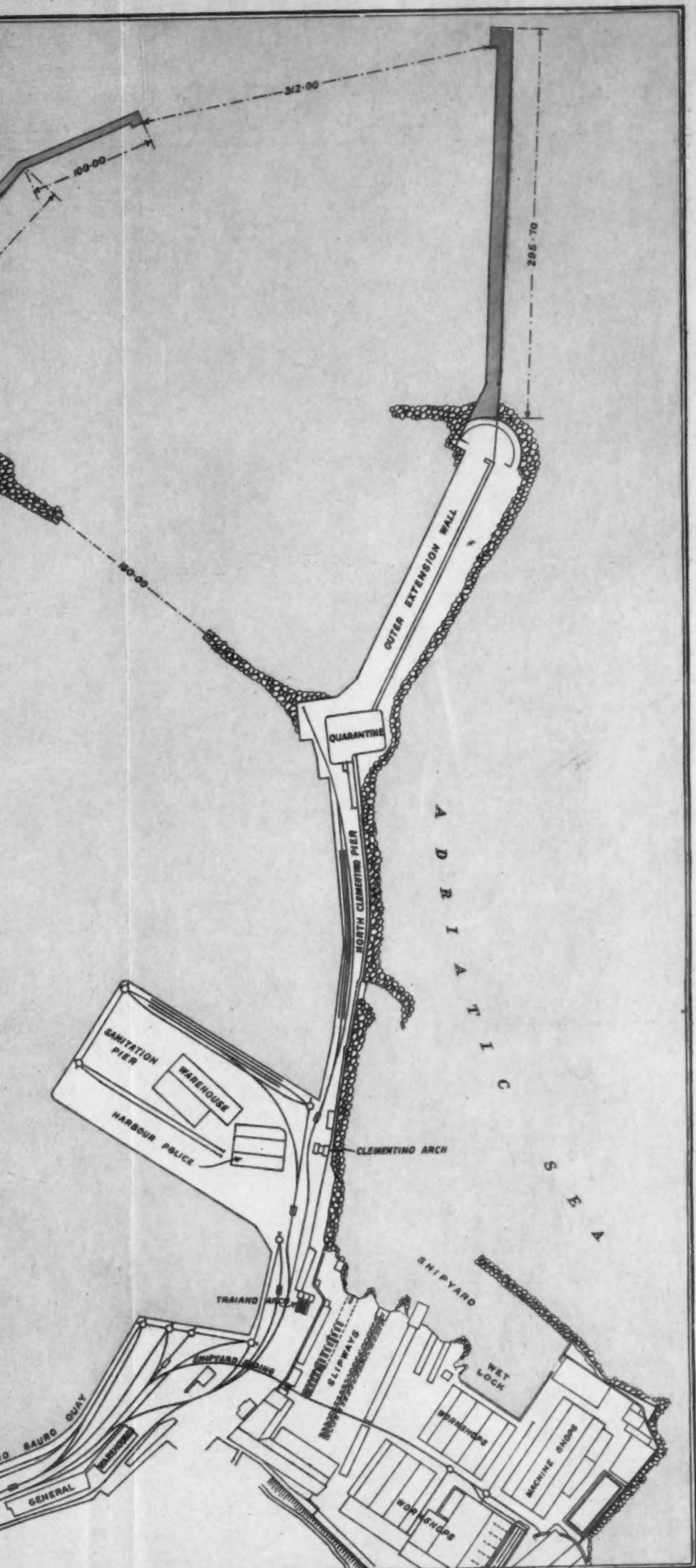
PORT OF ANCONA.

NOTE:— New Works in hand or proposed coloured RED.

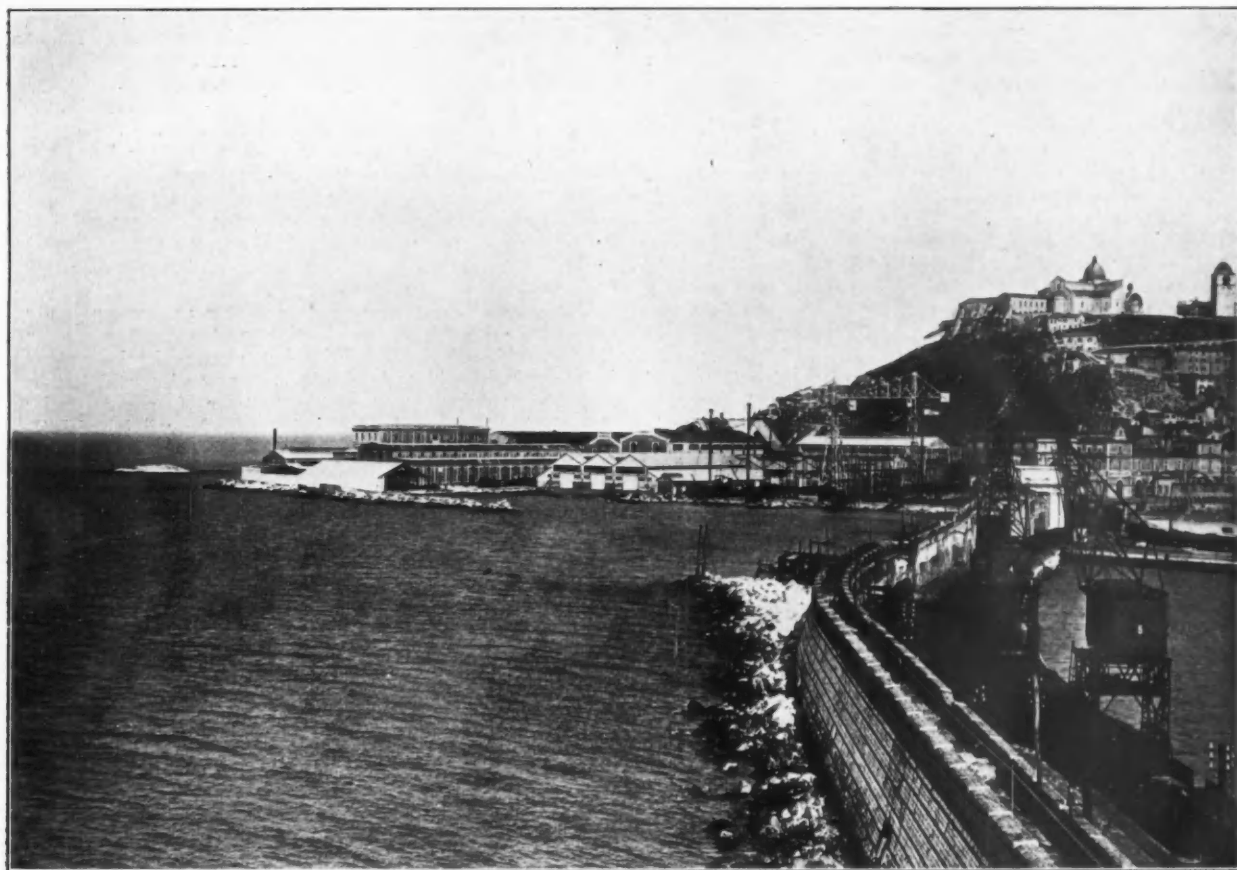


DNA.





The Port of Ancona



General View of the Ancona Shipbuilding Yard, belonging to the Cantieri Navali Riuniti S.A.



The New Quay.

The Port of Ancona and its Development—continued

among which there are those of the Cunard-Anchor Line, and of the Ellerman Wilson Line, etc.

In view of the important geographical position of the Port of Ancona the question of harbour facilities assumes considerable importance, and the Italian Government has recently allowed a credit of 150 million lire for the purpose of enlarging the Port of Ancona.

The present Port of Ancona has a water surface of about 7,200 square metres, but the southern part is accessible only to small ships, while the length of quayage reaches about 1,500 metres, including the following moles: Molo Nord, Molo Clementino, Molo della Sanità o Jona, Molo Trapezoidale, Molo Santa Maria and Molo Sud; and the following quays: Banchina S. Primiano, Banchina Nazario Sauro, Banchina "Tra i due moli," and Banchina Fryatt. In addition to the above-mentioned facilities, there is the oil trade pier, situated towards the head of the Molo Sud, and in the Southern Zone of the port there is a dock known as the Mandracchio, where there is only a depth of water of 4 metres. The width at the entrance of the port is about 150 metres. The depth of the water in the port varies from 5 to 9 metres.

All the quays are supplied with fresh water pipe lines and with railway tracks enabling direct unloading from ship to railway car, and *vice versa*. The railway cars are hauled by electric winches and oil tractors. The length of railway track in the Port of Ancona reaches 8.265 Km., with 36 exchanges and 20 turntable platforms. The quays and the moles are illuminated by electric light.

The unloading facilities in the Port of Ancona include three fixed electric cranes of 1½ tons capacity on the Mandracchio quays and five electric cranes of 4 tons capacity, of which three are placed on the Molo Clementino and two on the Molo Jona for the discharge of coal and other general cargo. In addition to these unloading facilities which are fitted on the quays in the Port of Ancona there are the following floating unloading facilities: One 60-ton floating self-propelled pontoon and two 10-ton floating pontoons, which have to be towed. The tugs available at Ancona include the following vessels: one of 10 h.p.,

one of 45 h.p., one of 80 h.p., one of 90 h.p., one of 135 h.p. and one of 387 h.p.

An appropriate number of lighters for coal bunkering of ships are available in Ancona and include: one lighter of 25 tons, one of 50 tons, one of 80 tons, two of 90 tons, five of 100 tons, three of 120 tons and one of 200 tons.

There has recently been completed in the Port of Ancona the construction of the works to enlarge the Santa Maria Mole, the construction of the building for the Harbour Master's Office on the same mole, the enlargement of the Pontile della Sanità and the reconstruction of the enlarged section of the Fryatt Quay.

The works for which the sum of 150 million lire have been granted include the construction of two breakwaters to protect the entrance of the port, the enlargement of the Southern Mole and, finally, important dredging works to create a canal of 4 metres depth in the Mandracchio Zone, and the excavation of the rocks and mud in the zone situated between the Southern Mole and the Pontile Santa Maria.

The urgency of harbour enlargements at Ancona is not only connected with the increased relations between Ancona and the Eastern side of the Adriatic, but also with the progress of industry in the hinterland of Ancona, and particularly of the chemical products output, and in the town of Ancona itself, where the shipbuilding yard of the Cantieri Navali Riuniti S.A. of Genoa is situated. In this connection it ought to be noted that the Cantieri Navali di Ancona, which used to be the former Arsenal of the Papal Navy, employs at present about 700 workmen, against 869 workmen employed in 1914. In 1919 the Cantieri Navali Riuniti S.A. of Genoa undertook the renewal of all the machinery in the shops, also adding to the plant a machinery factory and a locomotive repairing works, so that the Ancona plant may be considered as one of the most modern works existing in Italy.

Another important factor to be considered is the electrification of the Italian railways, as there are several lines situated in the hinterland of the port of Ancona, and this fact will greatly increase the speed of communications between the Port of Ancona and its hinterland.

Aden Port Trust

The following are the returns for the month of August, 1933, of shipping using the port:—

	No.	Tonnage
Merchant Vessels over 200 tons ...	112	463,164
" " under 200 tons ...	4	633
Government Vessels ...	2	8,394
Dhows ...	53	1,501
PERIM.		
Merchant Vessels over 200 tons ...	20	62,350

Rs.33,35,000, as compared with Rs.40,22,000 for August, 1932, and of exports Rs.24,98,000, as compared with Rs.26,47,000.

The total value of both imports and exports together was Rs.63,33,000, as compared with Rs.66,69,000 for the corresponding month last year.

Imports during the month were above those for August, 1932, in the case of coffee, grain, pulse and flour, gums and resins, hardware, hides (raw), skins (raw), sugar, twist and yarn,

TRADE OF THE PORT.

Article.	Unit	Imports.		Exports.	
		Quantity.	Value Rs.	Quantity.	Value Rs.
Coal ...	Tons	0	0	0	0
Coffee ...	Cwts.	7,262	2,07,552	6,433	2,36,085
Grain, Pulse and Flour ...	"	42,778	2,21,865	19,551	1,00,357
Gums and Resins ...	"	524	7,838	891	13,022
Hardware ...	"	0	17,796	0	22,428
Hides, raw ...	No.	2,080	1,390	4,096	4,570
Oil, Fuel ...	Tons	39,967	9,99,175	0	0
" Kerosene ...	Gls.	26,800	18,409	2,600	1,943
" Petrol ...	"	44,496	37,258	240	285
Salt ...	Tons	0	0	14,650	1,59,700
Seeds ...	Cwts.	3,121	19,092	1,043	8,786
Skins, raw ...	No.	495,186	2,56,787	605,834	4,44,488
Sugar ...	Cwts.	16,764	1,01,910	17,354	1,05,340
Textiles—					
Piece Goods, Grey ...	Yds.	3,374,200	4,39,129	3,552,610	4,36,090
" " White ...	"	526,575	82,328	253,105	43,691
" " Printed or Dyed ...	"	981,833	1,89,594	1,172,111	2,37,020
Twist and Yarn ...	Lbs.	176,300	75,560	176,542	73,903
Tobacco, Unmanufactured ...	"	630,000	93,426	329,476	53,634
" Manufactured ...	"	48,160	39,459	34,832	28,493
Other Articles ...	No. of Pkges.	51,901	7,26,694	11,910	3,27,044
Treasure, Private ...	"	0	2,99,455	0	2,01,630
Total ...	—	—	38,34,717	—	24,98,509

The number of merchant vessels over 200 tons that used the port in August, 1933, was 112, as compared with 110 in the corresponding month last year, and the total tonnage was 463,000, as compared with 462,000.

Excluding coal, salt, fuel oil, and military and naval stores and transshipment cargo, the total tonnage of imports in the month was 7,500, and of exports 4,300, as compared with 5,700 and 3,600 respectively for the corresponding month last year.

The total value of imports, excluding Government stores, was

tobacco (unmanufactured); and below in the case of seeds, piece goods (grey, white and printed or dyed), tobacco (manufactured) and treasure (private).

Exports were above those for August, 1932, in the case of grain, pulse and flour, hides (raw), seeds, skins (raw), sugar, piece goods (grey and white), twist and yarn, and tobacco (manufactured); and below in the case of coffee, gums and resins, hardware, piece goods (printed or dyed), tobacco (unmanufactured) and treasure (private).

Concrete and its Many Uses in Docks and Harbours—V

By *W. A. LINSKILL, M.Sc., A.M.Inst.C.E.*

CONCRETE PILES.

The Uses of Piles.
Piled Foundations.
Sheeting Piles Forming Wall.
Concrete Piles in Jetties.

WAREHOUSES. CONCLUSION.

Concrete Piles

THUS far we have considered concrete as replacing masonry in the construction of dock and harbour walls, where it passively resists, by its sheer dead weight and mass, the forces arising from earth pressure or wave action of the sea.

But when, suitably and sufficiently reinforced with steel, concrete is made into piles, it becomes a medium, during the process of pile driving, for transmitting the kinetic energy of the hammer throughout the length of the pile to its shoe.

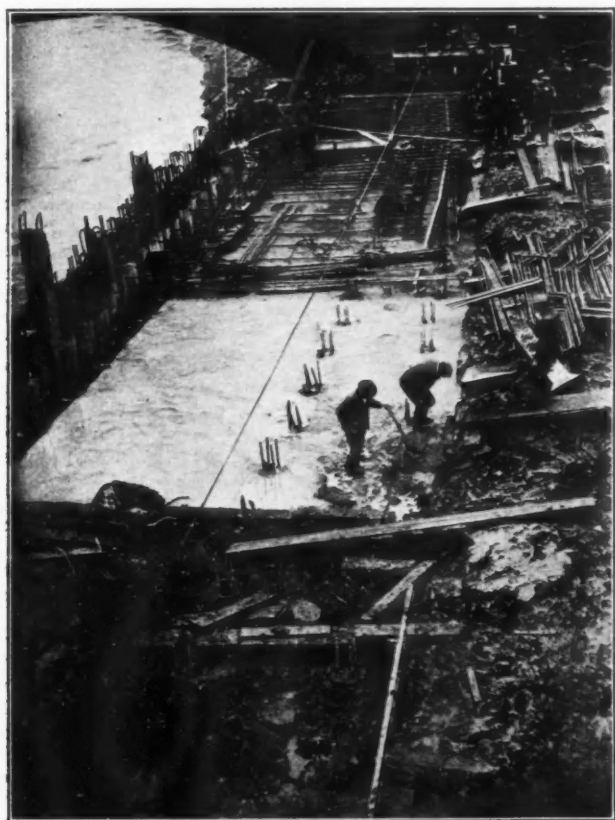


Fig. 1. Reinforced concrete piles in river wall and bridge foundation.

At each blow of the hammer the pile penetrates further into the ground, the movement per blow diminishing as the driving proceeds until a specified movement or "set" is reached, which means that the pile will then carry the safe load calculated to correspond to this "set," and thereafter will be able to withstand whatever compressive, tensile or bending stresses it may have been designed to meet.

A few words about the construction of piles may not be amiss here. The majority of concrete piles are pre-cast, and after proper maturing are pitched and driven in the same way as timber piles. But in a number of instances it has been found economical to cast piles in situ, by making a hole in the ground and filling it with concrete with or without reinforcement as may be desired.

A third way is to drive a pre-cast hollow concrete pile, which, on being afterwards filled with concrete—reinforced or plain—becomes part of the finished pile.

Pre-cast piles, of whatever cross section, are cast in a horizontal position in strongly made moulds supported on a firm base or platform.

The reinforcement consists of a framework or "cage," composed of four or more longitudinal rods of mild steel, tied together by links of a smaller diameter steel, usually $\frac{3}{16}$ inch or $\frac{1}{4}$ inch, and kept the required distance apart by "spreaders" or "forks" of wrought or cast iron, set diagonally.

The linking steel may be made up into separate links, each embracing two or more longitudinal rods, or may be wound round the framework in the form of a continuous spiral.



Fig. 2. Reinforced concrete piles in river bank to form wall.

The shoe, usually of cast iron, is diamond pointed or chisel shaped, as the shape of the pile requires, and has a shallow recess in its upper part into which the ends of the longitudinal rods are bent and housed. Two or more wrought iron straps projecting upwards from the shoe into the concrete hold it in position.

The concrete is usually rich in cement, mixtures of 3 to 1 and $2\frac{1}{2}$ to 1 being used.

After manufacture the concrete piles must be matured for a period which depends upon the kind of cement used. This time of maturing varies from about six or seven weeks for piles made with ordinary Portland cement, to a matter of comparatively a few hours if aluminous cement be used.

The long period first mentioned need not necessarily mean a delay to the works, as there are usually many preliminary operations which can be got on with in the meantime.



Fig. 3. River Training Wall formed of reinforced concrete piles faced with concrete.

Where time is important and no delay can be permitted, the difficulty can be overcome by the use of a rapid hardening cement.

Concrete and its Many Uses in Docks and Harbours—continued

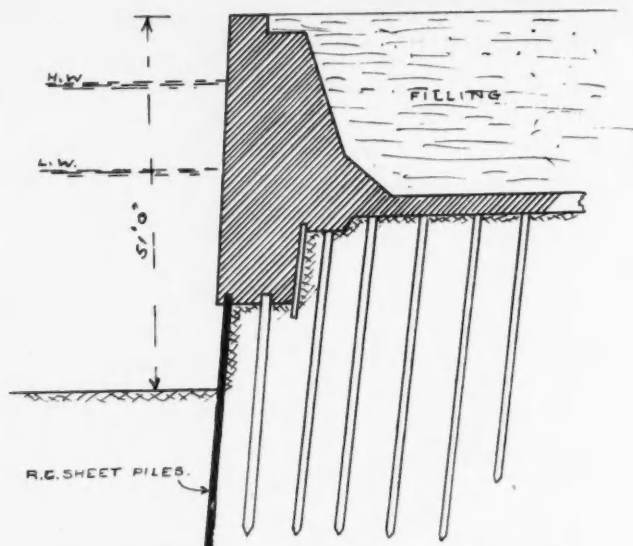


Fig. 4. Typical cross section of wall where sheeting piles support toe.

Delay from this cause may also be considerably reduced, or avoided entirely, by the adoption of some system of casting the piles in situ, provided that such system be applicable to the case under consideration.

The attainment of a specified set on concrete piles frequently results in a discrepancy between the length actually driven and the estimated length to which the piles have been made. A variety of causes may combine to produce this effect, which cannot always be provided against.

If the set be obtained before the piles are fully driven, further driving would probably damage the head of the pile, and the alternative is to cut off a portion of the pile, which is a waste of costly material.

On the other hand, to have to lengthen piles that prove to be too short because they do not give the specified set is also expensive and conducive to delay.

The greater inertia of a concrete pile as compared with a timber pile meant using heavier hammers. As the sizes of concrete piles increased, the weights of the hammers had perforce to keep pace, and these in turn needed heavier and stronger pile frames.

The delay during the maturing of pre-cast piles, the drawbacks arising from an incorrect estimate of the length of pile required, and the increasing costliness of heavier piling outfits combined to support investigation into and experiment with the idea of piles cast in situ.

If equally strong piles could be secured by this method it would possess the advantages of needing lighter driving hammers, of avoiding waste of time and materials, and of generally saving time on the work done.

To cast a pile in situ requires that a hole shall be made in the ground of the size and depth of the proposed pile. This may be accomplished either by boring out the earth in the usual way of sinking a borehole, or by displacing the ground by driving into it a hollow shell which can be withdrawn as the hole is filled with concrete.

To bore the hole does not provide any data upon which to base the bearing resistance of the pile, which can only be deduced from examination of the strata penetrated.

It is better to displace the ground by driving a hollow pile or shell, and this is the method adopted by one of the systems of in-situ piling now in use.

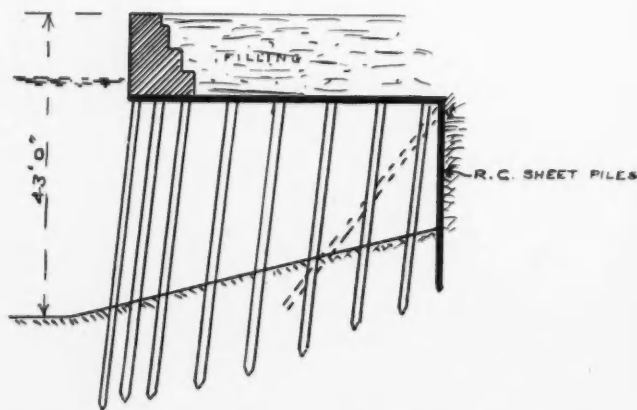


Fig. 5. Typical cross section of wall with sheeting piles at back.

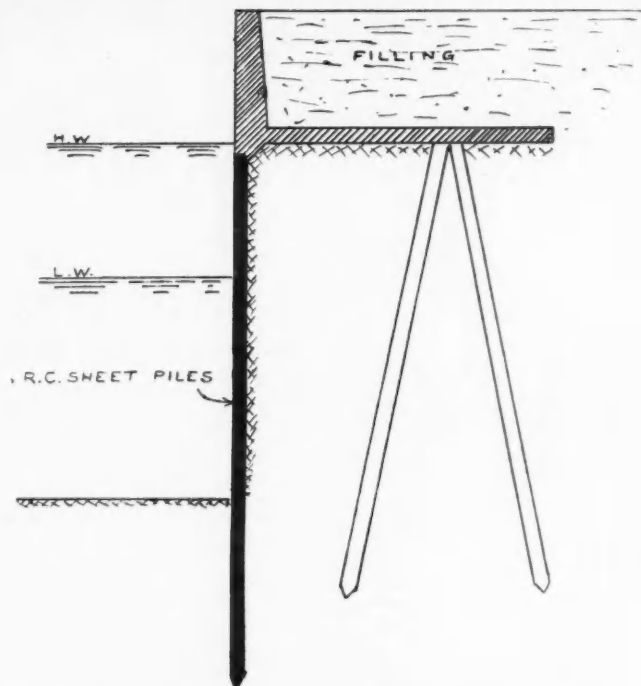


Fig. 6. Wharf wall of reinforced concrete and reinforced concrete sheet piles.

A steel tube of the same diameter as the proposed pile and closed at the bottom by a pointed shoe is driven into the ground until a specified set is obtained. The driving is then stopped and concrete in small batches is poured down the tube, each batch being well rammed. At intervals during this process the tube is withdrawn a few inches at a time.

The pile may be reinforced by introducing the reinforcement into the tube when the driving has ceased and before any concrete is poured in.

The shoe is either left behind when the tube is withdrawn or may be made in two parts which are hinged to the tube and which opening on withdrawal allow the concrete to pass through.

This system, although satisfactory for normal piling, has a limitation. It is not applicable, for instance, to piling for jetty work or similar under water piling.

Another system, that of driving a hollow pre-cast concrete pile and subsequently filling it with concrete either reinforced or plain, has interesting features.

In this system the hollow piles are composed of a number of pre-cast concrete tubes, suitably reinforced to withstand the driving, and made usually in lengths of three feet. These are joined together by light metal bands and are rendered watertight by the use of a bituminous preparation.

The shoe is of solid concrete also reinforced.

The driving mandrel is a stout steel tube, of a diameter which gives about half an inch clearance inside the concrete tubes. It transmits the blows of the hammer direct to the concrete shoe.

An adjustable collar clamped to the mandrel at the top of the pile, and screwed down tight on the top of the tubes, ensures



Fig. 7. Precast Cylinders.

Concrete and its Many Uses in Docks and Harbours—continued**Fig. 8. Bracing Beams.**

that they follow the shoe down, thus causing the pile to act as a complete unit.

Owing to their watertight joints, these piles should be suitable for jetty work or under-water work generally.

Among the many advantages claimed for this system of piling, there is one that must be unique, viz., the opportunity afforded of inspecting the pile from top to bottom *after driving*.

Illustrations Nos. 1, 2 and 3 show how these piles may be used to form a wall on the bank of a tidal river.

The Uses of Piles.

There are three main uses to which concrete piles may be put in dock and harbour work.

First there is the piled foundation. This is resorted to for dock walls where the ground is too yielding or waterlogged to support the weight of the wall, and where it is too costly or impracticable to sink lower to reach a firm foundation.

Piled foundations also include instances where piles are driven in tidal waters down to low water level, and the quay wall is founded on them at that level.

The second method of making use of piles is when they are driven in a continuous row to form sheeting for the purpose of retaining a bank of earth, and in this way they may in certain

circumstances in shallow waters take the place of the usual mass-concrete quay wall.

A third use is to form a jetty, pier, dolphin or similar structure by driving piles to a firm bearing in the bed of the sea, river or lake, and connecting the tops of the piles by beams upon which a deck or platform is fixed. By further bracing the piles together at a lower level a firm structure is ensured.

In some instances a continuous row of piles driven under the toe of a wall may serve to carry a portion of its weight and at the same time retain the ground under the wall, thus combining two of the uses mentioned.

Piled Foundations.

In a piled foundation, the dimensions and spacing of the piles are determined by the weight they have to carry and by their bearing resistance.

The weight a pile can carry depends upon its crushing strength, and also upon its bearing resistance, which is partly due to the friction between the pile and the surrounding ground and partly to the resistance to further penetration by the shoe which has usually encountered firmer ground or perhaps rock.

The action of driving piles in a foundation usually compresses and, to some extent, consolidates the ground, which is thus

**Fig. 9. Landing Stage Approach, Tilbury.**

Concrete and its Many Uses in Docks and Harbours—continued

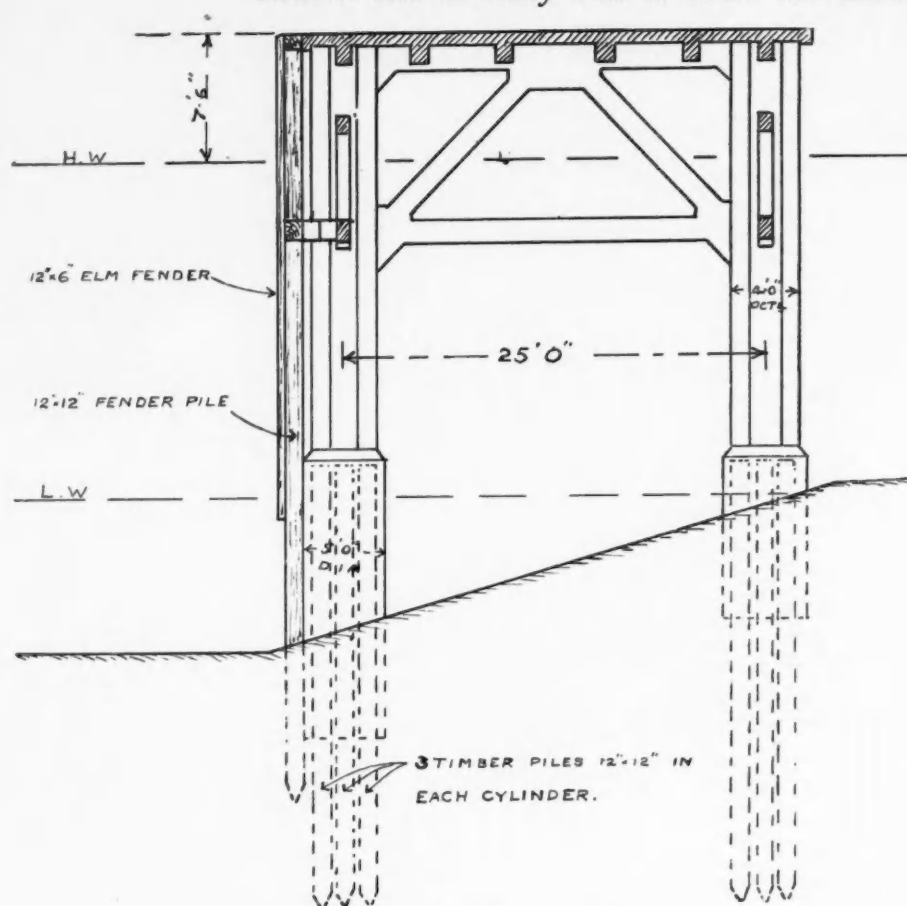


Fig. 10. Typical reinforced concrete jetty.

rendered capable of supporting an increased proportion of the load.

Instances have occurred where considerations of economy and expedition have led to the preferred use of timber piles in foundations, but usually the advantage lies with concrete piles, especially as regards their immunity from the destructive activities of certain forms of marine organic life.

The greater individual cost of the concrete pile as compared with the timber pile is balanced by the reduction in the number of piles required owing to their greater strength.

An instance of reinforced concrete piles being used in a foundation occurred during the extension, in 1914, of the docks at Tilbury, where the trench for the first length of one of the dock walls was sunk through a heavy mixture of clay and peat to a depth about 15-ft. above the layer of ballast, upon which it had been intended to found the wall.

Further sinking of the trench was impracticable for various reasons, and in lieu thereof reinforced concrete piles were driven in the foundation through the bad ground and into the ballast below.

In this case the foundation of the wall was below the dock bottom, but where walls are founded on piles at a higher level some method is necessary for holding back the ground underneath and behind the wall.

This could be done by driving a row of sheeting piles under the toe of the wall, in which position they would also serve to carry part of the weight of the wall.

Sometimes the sheeting piles are driven at the back of the wall. Illustration Nos. 4 and 5 show typical cases.

Sheeting Piles forming Wall.

An instance of the second use of piles is when a wharf or quay wall is formed by driving a row of sheet piles, strengthened by the inclusion at intervals of a king pile of larger dimensions.

In the simplest form the tops of the piles are broken down and rebuilt into a continuous coping of reinforced concrete, which may be tied back by long rods secured to anchor piles or to blocks of concrete, or to a vertical wall of concrete of light section buried beneath the ground.

A variation of this method is to drive short piles up to water level and then build a reinforced concrete retaining wall with a slab anchorage, as shown in Fig. 6.

A wharf wall on the Thames built on this principal was fully described and illustrated in a recent issue of this Journal*, and therefore needs no further description.

Many reinforced concrete wharf and quay walls are seen to be variations of this design.

The horizontal slab is sometimes nearer the surface of the ground or sometimes at a lower level, and the supporting piles behind the sheet piles vary to meet the loading conditions of the quay.

Concrete Piles in Jetties.

The appearance of piers and jetties is so familiar to everybody that detailed description is unnecessary and reference will only be made to the part taken by concrete in their construction.

The concrete piles used for this class of work either consist of single piles of large cross section, or smaller piles driven in clusters of 3, 4 or more inside a concrete cylinder.

Single piles 24 inches square and up to 77-ft. long have been used in some of the steamship ocean piers at American ports.

The reinforced concrete piles used for the jetties in King George V. Dock at the Port of London were octagonal in section and measured 18½-in. across the flats.

For a private jetty on the Thames, reinforced concrete piles 18-in. square and up to 67-ft. in length were used.

The cargo jetty at Tilbury is taken as an example where concrete piles were driven in clusters inside concrete cylinders. This jetty is 1,000-ft. long and 50-ft. wide, and is supported by three rows of cylinders, the outer rows being 5-ft. 6-in. in diameter and the centre row 7-ft. in diameter. The outer rows of cylinders had four piles in each and the centre row six piles each. The pre-cast cylinders were built up of short lengths, some of which are seen in Illustration No. 7, and were reinforced. They were sunk to the required depth by grabbing out the interior. The reinforced concrete piles were then driven inside and the cylinder subsequently filled with concrete. The bracing beams, shown in Illustration No. 8, were connected through holes left in the cylinders, and the concrete filling made the joint secure.

Similar cylinders were also used in the landing stage approach at Tilbury (Illustration No. 9).

One of the reasons for the use of concrete cylinders around piles is to afford protection to the latter against damage by ships during the process of berthing.



Fig. 11. A One-storey Reinforced Concrete Shed.

In some cases this is of frequent occurrence, and jetties, whether of concrete or timber, usually have timber fenders fixed in front of the concrete, or timberwork as the case may be.

A reinforced concrete jetty on the Thames, of which Fig. 10 shows the cross-section, has had its protective timbers damaged and sometimes displaced by ships.

In this instance, timber piles were used inside the cylinders.

Warehouses

In many ports it is noticeable how concrete is replacing brickwork or steel in the construction of dockside sheds and ware-

* The Dock and Harbour Authority, July, 1933.

Concrete and its Many Uses in Docks and Harbours—continued

houses. A view has already been given of one of the three-storey reinforced concrete sheds at the Gladstone Dock, Liverpool, and a one-storey shed is shown herewith in Illustration No. 11. It is of interest to note that this shed forms part of a jetty, its roof being the deck of the jetty.

Many warehouses has been founded on concrete piles, although they themselves may be built of other materials.

Grain silos, coal bunkers and other items of dock equipment are also being constructed of reinforced concrete.

Conclusion

This outline of the use of concrete for the more important features of docks and harbours by no means exhausts the subject. No mention has been made of the concrete surfacing of quays, the employment of concrete for the construction of dock

roads, bridge spans, fence walls and many other details where the adoption of concrete has made for economy, efficiency and durability.

But perhaps enough has been said to bring a fuller realisation of the importance of concrete to those who, having occasion to use our docks and harbours, may not hitherto have been sufficiently interested in their constructive details to be fully aware of the part taken by concrete in the progressive improvement of ports.

The Author's thanks are due to all those who have so kindly assisted him in the preparation of these articles, either by the loan of photographs or in other ways. For particular help rendered he would like to add the names of Major M. Du-Plat-Taylor and Mr. A. T. Best to those of other engineers previously mentioned.

The Port of New York

Value of Foreign Trade at the Port of New York.

THE value of foreign trade at the Port of New York for June and July, 1933, was 14 and 52 per cent. respectively greater than in the same months last year, and marked the first time since the latter part of 1929 that a favourable comparison with a period in a previous year is shown. The great difference in the percentage gains in June and July is due not only to the increase in July over June, but also to the fact that the value of foreign trade in July, 1932, was less than the preceding month. Comparative figures for the two months are shown in the following tables, which are the results of an analysis of the records of the United States Department of Commerce.

Value of Foreign Trade at the Port of New York.

		June		Net Change	
		1933	1932	Amount	Per Cent.
Exports	...	37,233,000	36,818,000	+ 415,000	+ 1.1
Imports	...	64,512,000	52,482,000	+ 12,030,000	+ 22.9
Exports and Imports		101,745,000	89,300,000	+ 12,445,000	+ 13.9

		July		Net Change	
		1933	1932	Amount	Per Cent.
Exports	...	39,536,000	35,137,000	+ 4,399,000	+ 12.5
Imports	...	70,955,000	37,657,000	+ 33,298,000	+ 88.4
Exports and Imports		110,491,000	72,814,000	+ 37,677,000	+ 51.7

The increase in the value of foreign trade at the Port of New York compares very favourably with that of the United States as a whole. The increase for all ports in the United States in July was 55 per cent.; exports gained 36 per cent. and imports 81 per cent. The exports at New York amounted to 27 per cent. of the total for all ports, while the imports represented 50 per cent.

In commenting upon the increase of the foreign trade of the United States in July, the Manufacturers' Export Association states: "The latter (import) increase is unquestionably due not only to the creditor status of our country asserting itself, but also to the demand for more raw materials from abroad arising as a consequence of our industrial revival. This import trade definitely creates exchange which permits the expansion of our exports. While our prices have risen here, the increase is still less than the depreciation of the American dollar abroad and allows exporters to meet competition and brings goods into the hands of the foreign buyers at less cost than before. A continued operation of these two forces is confidently expected with a continued increase in both exports and imports."

Among the export commodities which registered increases at the Port of New York in July were furs and manufactures, 82 per cent.; leather, 66 per cent.; copper and manufactures, 65 per cent.; and petroleum and products, 25 per cent. The largest percentage decrease was in apples, 78 per cent., other items being fruits and nuts (including apples), 38 per cent., and industrial machinery, 14 per cent.

It is in the July imports at the Port of New York that we find the most interesting figures. More than 75 per cent. of the items and groups of items show increases over July of last year. The textile group increased in all categories from \$8,822,177 to \$15,209,393, a net gain of 72 per cent. Some of the increases are quite startling, as, for instance, furs and manufactures, which gained by \$3,898,640, or 1516.5 per cent., and dyeing and tanning materials, which increased 1184.4 per cent. Gains of several hundred per cent. all along the list are common.

The following figures give the geographical distribution of the foreign trade of the Port of New York for the first six months of 1933 compared with 1932:—

Value of Exports of Domestic Merchandise and Imports at the Port of New York by Continents.

		January to June		Net Change	
		1933	1932	Amount	Per Cent.
Europe	...	218,632,421	257,572,595	-38,940,174	-15.1
North America	...	57,401,641	67,988,796	-10,587,155	-15.6
South America	...	87,431,396	109,487,189	-22,055,793	-20.1
Asia	...	123,971,940	149,769,881	-25,797,941	-17.2
Oceania	...	5,737,805	6,904,526	-1,166,721	-16.9
Africa	...	18,213,789	22,657,524	-4,443,735	-19.6
Total	...	511,388,992	614,380,511	-102,991,519	-16.8

Among the European countries, the United Kingdom was our best customer, taking our cargoes to the value of \$34,234,400, while imports from that country amounted to \$27,783,918. Exports to United Kingdom were 23 per cent. less than in the previous year, and imports 3 per cent. greater. Gains were registered in exports to Austria, Finland, Latvia and Portugal, while imports increased from Denmark, Latvia, Netherlands, Poland, Roumania, Soviet Russia, Switzerland, United Kingdom and Jugoslavia.

Exports to Cuba in the six months period were valued at \$6,528,346, a decrease of 20 per cent., while imports were \$10,265,454, an increase of 2 per cent. Exports to South American countries increased 21 per cent., with Bolivia registering the greatest percentage gain, 156 per cent., and Brazil the largest gain in value, amounting to \$3,310,417, being an increase of 60 per cent.

In Asia, Palestine received 210 per cent. more from New York than in the period last year, while imports from that country were 3 per cent. less. Commerce with Iraq increased 143 per cent. in our exports, but was 61 per cent. less in shipments from that country. Trade with Canary Islands (which is grouped with Africa) increased 12 per cent. in exports from New York and 64 per cent. in imports.

Vessel Movement in Foreign Trade.

Entrances and clearances of vessels in foreign trade at the Port of New York in July, 1933, were 442 and 433 respectively, and were greater than in the corresponding month last year. The number of vessels entered and cleared in August, 1933, exceeded those of the previous month, but the number of entrances was slightly less than in August, 1932.

		July		Net Change	
		1933	1932	Amount	Per Cent.
Entrances, No. of Vessels	...	442	398	+ 44	+ 11.1
Clearances, No. of Vessels	...	433	422	+ 11	+ 2.6
Entrances, Net Reg. Tonnage	...	2,234,300	2,168,285	+ 66,015	+ 3.0
Clearances, Net Reg. Tonnage	...	2,148,040	2,244,257	-96,217	-4.3

		August		Net Change	
		1933	1932	Amount	Per Cent.
Entrances, No. of Vessels	...	453	460	-7	-1.5
Clearances, No. of Vessels	...	473	446	+ 27	+ 6.1
Entrances, Net Reg. Tonnage	...	2,432,336	2,494,315	-61,979	-2.5
Clearances, Net Reg. Tonnage	...	2,515,308	2,382,535	+ 132,773	+ 5.6

A compilation of data for eight months January to August shows that entrances and clearances at the Port of New York are still below those of last year.

		January to August		Net Change	
		1933	1932	Amount	Per Cent.
Entrances, No. of Vessels	...	3,249	3,576	-327	-9.1
Clearances, No. of Vessels	...	3,397	3,660	-263	-7.2
Entrances, Net Reg. Tonnage	...	17,260,369	18,720,154	-1,459,785	-7.8
Clearances, Net Reg. Tonnage	...	17,692,009	18,776,984	-1,084,925	-5.8

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The Port of New York—continued

Steamship Passenger Traffic.

Passengers arriving and departing from and to foreign countries at the Port of New York during the fiscal year ending June 30th, 1933, numbered 740,769 persons, being 9 per cent. less than in the previous fiscal year. The outbound movement of passengers numbered 411,779, as against 328,990 arrivals. Departing aliens numbered 165,363, while the number of aliens arriving was 102,219. It is interesting to note that immigration dropped from 21,500 in the fiscal year 1932 to 12,944, a difference of 40 per cent. United States citizens travelling abroad were slightly in excess of arrivals.

	Fiscal Year ending June 30		Net Change	
	1933	1932	Number	Per Cent.
INBOUND—				
Aliens, Immigrant ...	12,944	21,500	-8,556	-39.8
Aliens, Non-Immigrant ...	89,275	93,746	-4,471	-4.8
U.S. Citizens ...	226,771	246,946	-20,175	-8.2
Total ...	328,990	362,192	-33,202	-9.2
OUTBOUND—				
Aliens, Emigrant ...	48,444	54,457	-6,013	-11.0
Aliens, Non-Emigrant ...	116,919	130,871	-13,952	-10.6
U.S. Citizens ...	246,416	266,760	-20,344	-7.6
Total ...	411,779	452,088	-40,309	-8.9
Total Inbound and Outbound	740,769	814,280	-73,511	-9.0

The number of passengers in foreign travel at the Port of New York in the fiscal year 1933 represented 71 per cent. of the total at all ports in the United States.

There has been a definite upward trend in the number of passengers travelling between New York and other domestic ports via the water lines during the first half of the year.

Up to the end of June, a total of 299,289 passengers were carried by those lines operating in the Intercoastal, Coastal, Sound and River services, and compares with 279,065 reported for the same period last year.

These figures do not include passengers carried on the one-day cruises via the Long Island Sound or excursions to local or Hudson River points.

This increase over 1932 has been steadily maintained since the first of the year and applies to the four classes of service mentioned above.

Commerce at Port Newark.

The water-borne commerce at Port Newark in July, 1933, increased considerably over the same period last year as well over the preceding month. Lumber receipts by steamer and lighter increased from 6,000,000 board feet in July, 1932, to nearly 14,000,000 feet in that month this year, a gain of 128 per cent. Lumber shipped inland from Port Newark amounted to 17,376,131 board feet, an increase of 79 per cent. over last year. Railroads carried 7,890,000 board feet of these inland shipments, while 9,486,000 feet moved by truck. Steamers arriving at Port Newark during the month numbered 35, as against 26 in July, 1932.

Water-borne Receipts at Port Newark.

	July		Net Change	
	1933	1932	Amount	Per Cent.
All Commodities (tons)...	47,814	15,926	+31,888	+200.2
Lumber (board feet) ...	13,826,394	6,067,620	+7,758,774	+127.9
Other than lumber (tons) ...	27,075	6,825	+20,250	+296.7

Cargo other than lumber increased by 20,250 tons, or 297 per cent. over last year, the total gain for all receipts of water-borne cargoes being 200 per cent.

During the seven months, January to July, 1933, the total receipts by vessel amounted to 280,012 tons, which was 71,650 tons or 34 per cent. greater than in the same period last year. Receipts of lumber increased 12 per cent., while cargo other than lumber gained 47 per cent. over the first seven months of 1932.

Water-borne Receipts at Port Newark.

	January-July		Net Change	
	1933	1932	Amount	Per Cent.
All Commodities (tons)...	280,012	208,362	+71,650	+34.4
Lumber (board feet) ...	76,095,848	67,859,807	+8,236,041	+12.1
Other than lumber (tons) ...	183,167	124,600	+58,567	+47.0

Receipts, Storage and Export of Grain at the Port of New York

For the first time in many months the receipts of grain at the Port of New York exceeded that of a similar period in the previous year. The July, 1933, receipts amounted to 2,803,974 bushels, as compared with 2,684,880 bushels in the same month last year, an increase of 4 per cent. The increase was due to a heavier canal movement, which was 37 per cent. greater than in July, 1932.

Receipts of Grain (bushels)

	July		Net Change	
	1933	1932	Amount	Per Cent.
Rail ...	52,600	720,300	-667,700	-92.8
River ...	64,958	—	+64,958	—
Coast ...	—	*800	-800	-100.0
Canal ...	2,686,416	1,963,780	+722,636	+36.8
Total ...	2,803,974	2,694,880	+119,094	+4.4

*Argentine Corn.

The receipts in August, 1933, were 11 per cent. less than last year, falling off from 2,991,338 to 2,674,490 bushels.

Receipts of Grain (bushels)

	August		Net Change	
	1933	1932	Amount	Per Cent.
Rail ...	70,700	218,800	-148,100	-67.7
River ...	36,000	—	+36,000	—
Canal ...	2,567,790	2,772,538	-204,748	-7.4
Total ...	2,674,490	2,991,338	-316,848	-10.6

The total grain receipts at the port for eight months, January to August, 1933, were 13,301,197 bushels, as against 25,712,314 bushels in the same period of 1932, a drop of 48 per cent. The rail receipts fell off heavily during this period, as compared with last year, from 11 million to 1 million bushels. Canal receipts declined 26 per cent., but a more favourable comparison would be to include in the 1933 canal figures the 1,610,272 bushels which were shipped via the river from Albany, which brings the decline down to 15 per cent. Facilities for storing and shipping grain at Albany were not available last year, all canal grain coming through to New York Harbour direct.

Receipts of Grain (Bushels).

	January-August		Net Change	
	1933	1932	Amount	Per Cent.
Rail ...	1,086,100	11,399,400	-10,313,300	-90.5
River ...	1,610,272	—	+1,610,272	—
Coast ...	—	3,265	-3,265	-100.0
Canal ...	10,604,825	14,309,649	-3,704,824	-25.9
Total ...	13,301,197	25,712,314	-12,411,117	-48.5

The visible supply of domestic and Canadian grain, both in elevators and afloat, at the Port of New York on September 2nd, 1933, was 1,744,000 bushels, 50 per cent. less than on the same approximate date last year, when 3,452,000 bushels were on hand.

Visible Supply (Bushels).

	Sept. 2		Sept. 3		Net Change	
	1933	1932	1933	1932	Amount	Per Cent.
All Grain ...	1,744,000	3,452,000	—	—	-1,708,000	-49.5
Wheat ...	751,000	2,727,000	—	—	-1,976,000	-72.5
Barley ...	—	4,000	—	—	-4,000	-100.0
Corn ...	496,000	181,000	—	—	+315,000	+174.0
Oats ...	326,000	192,000	—	—	+134,000	+69.8
Rye ...	171,000	348,000	—	—	-177,000	-50.9

Exports of domestic and Canadian grain at the Port of New York for the nine weeks period July 1st to September 2nd, 1933, amounted to 2,778,000 bushels, as compared with 5,332,000 bushels in the corresponding period last year, a decline of 48 per cent. This falling off was due mainly to a decline amounting to practically 100 per cent. in exports of domestic grain.

Exports of Grain at the Port of New York (bushels)

	Nine Weeks Ending		Net Change	
	Sept. 2, 1933	Sept. 3, 1932	Amount	Per Cent.
Domestic and Canadian Grain	2,778,000	5,332,000	-2,554,000	-47.9
Domestic Grain ...	6,000	1,650,000	-1,644,000	-99.6
Canadian Grain ...	2,772,000	3,682,000	-910,000	-24.7

Total exports at the port during the 35 weeks, January 1st to September 2nd, 1933, amounted to 12,972,000 bushels, a decline of 58 per cent. from the 30,931,000 figure for the same period last year.

Exports of Grain at the Port of New York (bushels)

	January 1st to		Net Change	
	Sept. 2, 1933	Sept. 3, 1932	Amount	Per Cent.
Domestic and Canadian Grain	12,972,000	30,931,000	-17,959,000	-58.0
Domestic Grain ...	523,000	11,254,000	-10,731,000	-95.4
Canadian Grain ...	12,449,000	19,677,000	-7,228,000	-36.7

Receipts of Petroleum and Products at Atlantic Coast Ports.

Imports of petroleum (crude and refined oils) at the Port of New York during the month of August, 1933, totalled 3,478,000 barrels as compared with 2,253,000 barrels in the same month last year, an increase of 54 per cent. New York handled 66 per cent. of the petroleum imports at all ports of the United States during the month. A comparison of the figures for the Port of New York with other Atlantic Coast ports follows:—

Imports of Crude and Fuel Oil.

	August		Net Change	
	1933	1932	Amount	Per Cent.
New York ...	3,478,000	2,253,000	+1,225,000	+54.4
Boston ...	76,000	67,000	+9,000	+13.4
Philadelphia ...	1,038,000	794,000	+244,000	+30.7
Baltimore ...	427,000	103,000	+324,000	+314.6
Other Atlantic Ports ...	209,000	65,000	+144,000	+221.5
Gulf Ports ...	67,000	—	+67,000	—
Total United States ...	5,295,000	3,282,000	+2,013,000	+61.3

The Port of New York—continued

The total volume of imports of petroleum for eight months, January to August, for the two years is given below. The differences between the two years are minus, since the imports for the first six months of 1933 were less than in 1932.

Imports of Crude and Fuel Oil					
	January-August		Net Change		
	1933	1932	Amount	Per Cent.	
New York	20,261,000	32,205,000	-11,944,000	-37.1	
Boston	823,000	2,161,000	-1,338,000	-61.9	
Philadelphia	6,899,000	7,461,000	-562,000	-7.5	
Baltimore	2,025,000	5,528,000	-3,503,000	-63.4	
Other Atlantic Ports	1,865,000	6,445,000	-4,580,000	-71.1	
Gulf Ports	477,000	4,584,000	-4,107,000	-89.6	
Total United States	32,350,000	58,984,000	-26,634,000	-44.6	

The receipts of oil from California at the Port of New York in the month of August, consisting of gasoline and kerosene only, were 374,000 barrels, which was 46 per cent. or 323,000 barrels less than in that month last year. The receipts at Philadelphia, however, amounted to 466,000 barrels, an increase of 232,000 barrels or 99 per cent., as shown in the following comparative table:—

Receipts of California Oil.					
	August		Net Change		
	1933	1932	Amount	Per Cent.	
New York	374,000	697,000	-323,000	-46.3	
Boston	54,000	—	+54,000	—	
Philadelphia	466,000	234,000	+232,000	+99.1	
Baltimore	77,000	188,000	-111,000	-59.1	
Other Atlantic Ports	221,000	238,000	-17,000	-7.1	
Gulf Ports	—	—	—	—	
Atlantic and Gulf Ports	1,192,000	1,307,000	-115,000	-8.8	

The total volume of California oil received in the eight months January to August, 1933, at Atlantic and Gulf ports, was 48 per cent. greater than in the same period in 1932, all ports registering increases with the exception of New York, which declined 8 per cent.

Receipts of California Oil.					
	January-August		Net Change		
	1933	1932	Amount	Per Cent.	
New York	3,538,000	3,859,000	-321,000	-8.3	
Boston	146,000	53,000	+93,000	+175.5	
Philadelphia	2,973,000	1,694,000	+1,279,000	+75.5	
Baltimore	984,000	713,000	+271,000	+38.0	
Other Atlantic Ports	2,565,000	982,000	+1,583,000	+161.2	
Gulf Ports	739,000	72,000	+667,000	+926.4	
Atlantic and Gulf Ports	10,945,000	7,373,000	+3,572,000	+48.4	

Italian Harbour Affairs

ACCORDING to an announcement which has been published by the "Gazzetta Ufficiale," a credit of 27,500,000 lire has just been allowed for undertaking the necessary repairs to the breakwaters at Catania. These repairs will be made with 250-ton concrete blocks, owing to the strength of waves in that port.

In order to favour the direct loading of marble, the Ministry of Public Works has allowed a credit of over 5 million lire for the construction of a port at Marina di Carrara.

The fact that the question of the Austrian transit trade through the Port of Trieste has again been taken up has attracted considerable attention to the improvements in the efficiency of harbour facilities at Trieste.

Among the most important works undertaken in the Port of Trieste is the Molo VI., where a set of warehouses fitted with up-to-date unloading facilities has been built. Five hundred car-loads of general cargo can be loaded or unloaded in this part of the Port of Trieste in the course of a day. The Azienda dei Magazzini Generali, on the other hand, has just announced that the construction of the grain silos in the Porto Franco Duca d'Aosta, are soon to be started, and that they will be completed by the spring of 1935. The grain silos will have a capacity of 30,000 tons of cereals, but in the warehouses of the Molo VI. there will be space for an additional 30,000 tons of cereals, so that the total storage capacity for cereals in the Port of Trieste will be 60,000 tons, and the handling capacity of cereals will be over 300,000 tons during a season.

The addition of the 150-ton electric floating crane—built at the Cantiere San Marco of the Cantieri Riuniti dell'Adriatico—to the floating unloading facilities of the Azienda dei Magazzini Generali has made it possible for Trieste steamship companies to accept heavy weights, such as railway cars, etc., for shipment from and to that port. It should be noted that the total cost of the works undertaken in the Port of Trieste will reach 200 million lire, and there are several important works which are still to be completed, such as the fitting-out of the lumber dock at Servola, etc. The Royal Dutch Shell has, furthermore, increased by about 30,000 tons the capacity of their oil tanks in the Port of Trieste, while the Raffineria Olii Minerali connected with the Standard Oil Co. is planning to increase its output capacity from 60,000 to 120,000 tons. To meet these increases in the oil traffic, the Harbour Master of Trieste has arranged to build a jetty in iron, fitted with the necessary pipe lines to facilitate the unloading of oil. The following figures show the quantity of imports and exports at Trieste:—

	Imports Tons	Exports Tons	Total Tons
1911	2,144,125	928,054	3,072,179
1913	2,314,019	1,135,712	3,449,730
1919	1,356,657	122,271	1,478,928
1920	1,183,666	290,846	1,474,512
1925	1,905,727	958,577	2,864,304
1930	1,636,438	803,164	2,439,602
1932	1,822,417	649,882	2,472,299

Full figures for shipping at all Italian ports during the month of August, 1933, have not been published as yet, but an idea of shipping during this period can be obtained from an examination of the figures relating to Genoa and Venice. According to statistics which have been published by the Consorzio Autonomo

del Porto di Genova, goods imported during the first eight months of 1933 included 3,518,383 tons, against 3,350,238 tons imported during the corresponding period of 1932, and goods exported totalled 542,889 tons, against 492,888 tons during January-August, 1933. The following figures detail the main goods imported at Genoa during August, 1933:—

	August 1933 Tons	August 1932 Tons
Coal	173,454	147,910
Cereals	34,884	76,886
Cotton	9,251	12,742
Wool	3,963	3,427
Skins	2,907	977
Phosphates	18,858	6,138
Oil	31,643	20,403
Frozen Meat	2,757	2,398
Lumber	13,842	14,405
Other Goods	132,803	105,928
	424,365	391,214

The increase has continued uninterruptedly since the beginning of this year, so that it may be expected that at the end of 1933 shipping at Genoa will show an increase compared to 1932. According to investigations which have been made in the course of the past few months, goods arriving in Genoa from the hinterland by motor truck have considerably increased, and since this system of transportation necessitates a decrease in railway transportation, the Consorzio Autonomo del Porto at Genoa has decided to collect a tax on goods brought by motor truck to level up any decrease in the receipts by the Port of Genoa Authority from railway traffic.

Another interesting feature of the activity of the Port of Genoa is represented by the activities of the Genoese Drydocking Corporation (S.A. Ente Bacini) where, during August, 1933, 320 ships representing 1,682,655 gross tons have been drydocked, against 358 ships representing 1,699,079 gross tons during the month of August, 1932.

The Provveditorato del Porto di Venezia has published figures for shipping at that port during the month of August, 1933, and which are as follows:—

	Imports Tons	Exports Tons	Total Tons
August 1933	252,344	98,694	291,038
August 1932	211,415	38,582	249,997
Total	+40,929	+112	+41,041

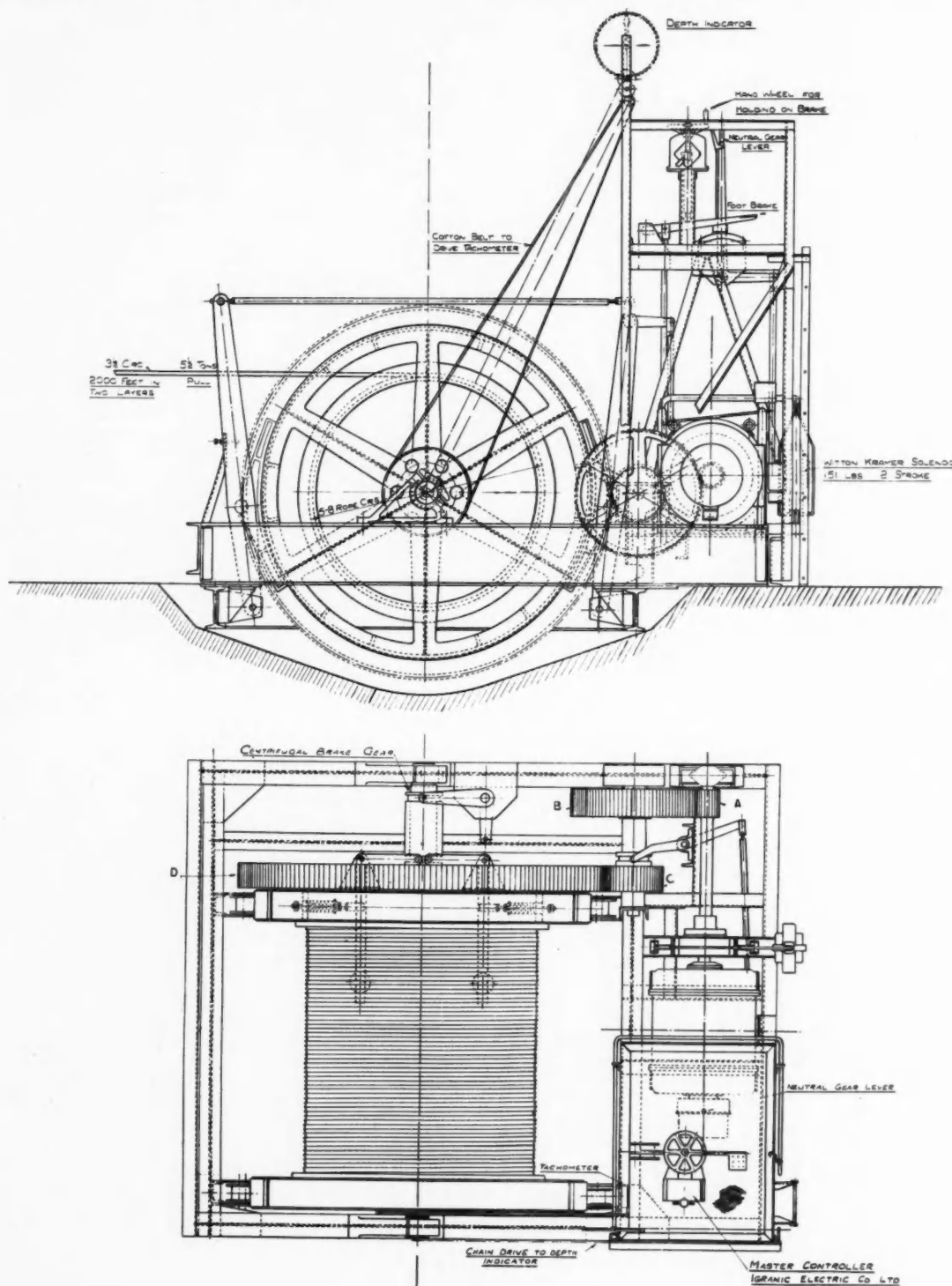
There has been an increase in the arrivals of coal and chemical fertilisers, while imports of cereals have decreased. The situation of exports from Venice has remained unaltered. Work on the construction of the Mussolini Quay connecting the Schiavoni Quay with the St. Helen Island is well forward, as well as the dredging works carried on in the canal connecting the Adriatic Sea with the interior of the Venetian lagoon through the Port of Lido, in order to ensure the safe entry of large liners, the number of which has considerably increased in the course of the past two years in the Port of Venice.

It is announced that the Ministry for Public Works has authorised the Port of Naples Authority to undertake the construction of three temporary sheds along the temporary maritime passenger station on the Beverello Mole, in order to facilitate the landing of passengers during bad weather.

Electric Haulage Winch supplied to the River Wear Commissioners, Sunderland for use at the North Dock, High Level, Monkswearmouth

MESSRS. STOTHERT AND PITT, LTD., Bath, have recently supplied to The River Wear Commissioners, Sunderland, an interesting electric haulage winch, which is now being used at the North Dock, High Level, Monkswearmouth. It has been designed for hauling railway trucks, having a gross load of 50 tons, up an incline

two control notches in either direction and an additional notch on the lowering side to release the solenoid brake. The contactor panel is of the open type, provided with five accelerating contactors operating under the control of a timing relay which functions on the last step of the master controller. The barrel wheel pinion is so arranged that it can be drawn out of gear



640-ft. long with a rise of 60-ft. at a speed of 4 miles per hour, the empty trucks being lowered down the incline by gravity at a speed up to 20 miles per hour.

The winch, which is situated near the top of the incline, consists of a large cast iron barrel with turned grooves for accommodating 2,000-ft. of $3\frac{1}{2}$ -in. circumference steel wire rope in two layers, and a return pulley is fitted for the hauling rope at the top of the incline. The drive is effected by a continuously rated slip ring induction type motor of 150 b.h.p., designed to give a pull out torque of not less than that equivalent to 350 b.h.p. through two reductions of machine-cut steel spur gearing, and is fitted with an automatic solenoid brake. The winch is controlled by a three-speed master controller, having

to allow the barrel to be free of the gearing and motor when lowering at speed down the incline. Under these conditions the barrel is controlled by two mechanical post brakes, one at each end, and further, it is fitted with an automatic centrifugal brake so arranged that should the lowering speed exceed 20 miles per hour, the main brakes come into operation irrespective of the drive. The driver's platform is mounted well above the winding barrel, and is fitted with the master controller brake gear, neutral gear lever, depth indicator and tachometer.

The motor and the control gear used in connection with the winch were supplied by Messrs. J. H. Holmes and Co., Ltd., and Messrs. The Igranic Electric Co., Ltd., respectively.

Clyde Navigation Trust

South African Trade with Glasgow

Large Fruit Consignment arrives in the Clyde.

ONE of the most important developments in connection with trade from overseas, particularly from within the Empire, took place this month with the arrival of the first direct shipment of citrus fruits from South Africa at Glasgow, the Lamport and Holt vessel, "Marconi," under charter to the Union Castle Line, arriving with a cargo of 25,500 cases of fruit.

This shipment is the outcome of a three years' persistent campaign by the Clyde Trust's commercial manager with the object of building up and developing South African trade with Scotland. In this mission he has had the active co-operation and support of the High Commissioner for South Africa, Mr. C. T. de Water, who a year or so ago, at the invitation of the Clyde Trust, paid a special visit to Glasgow—and to Liverpool—to investigate the position and the claims made that Glasgow and the Northern markets of Britain were being neglected by South African interests owing to the concentration of the shipment of supplies to Southampton. The High Commissioner was duly impressed with the result of his visits to the Northern markets and ports, and one of the first results of the various representations made was the opening up of a direct supply to the Liverpool market, which, like Glasgow, had hitherto been fed from Southampton.

Following on this development, the Commercial Manager of the Clyde Trust has during the past 18 months created and maintained an increasing interest in this question among the Press and producers throughout the Union of South Africa and Rhodesia, in addition to having important conferences with various Ministers of the South African Parliament, with the result that, as previously recorded in our columns, a special visit was paid to Glasgow by Mr. L. C. Le Roux, Chairman of the Perishable Products Control Board of South Africa, and Mr. C. A. Smith, Shipping Manager of the South African Railways, accompanied by Mr. J. H. Dimond, the South African Trade Commissioner in London, and Mr. B. W. Harlow, overseas representative of the Co-operative Citrus Exchange, to confer with all interests concerned as to what improvements might be effected in the representation of the fruit industry in Scotland, and as to the question of establishing a regular and direct shipping service for South African fruits and produce with Glasgow in place of the present costly method of distribution from Southampton.

The arrival of the "Marconi" and her cargo this month was the first tangible result of this visit and a matter of satisfaction to the traders concerned, who for so long have had to contend with the uneconomic disadvantages of endeavouring to build up trade on behalf of the South African fruit industry through being compelled to draw supplies from Southampton. The shipment proved a great success, the whole of the cargo being discharged, sold and placed into consumption within 48 hours at satisfactory prices comparable with those ruling on all other markets.

As the citrus season is almost at a close, this may be the only shipment this year, but it is confidently hoped that next season will see the establishment of a regular service to Glasgow and Liverpool, with increasing quantities of fruit for the respective markets.

We understand that Mr. Ford, the Commercial Manager of the Clyde Trust, is also engaged in establishing trade on the Scottish markets in other South African commodities, such as eggs, canned fruits, dried fruits, etc., whilst investigations are also being made with a view to developing shipments of both meat and live cattle to Glasgow.

In a special interview, Mr. Ford expressed the view that the increased number of shipments and quantities of fruit being sent to Liverpool, and the despatch of the "Marconi"—although late in the season—with her cargo to Glasgow, was an indication that the South African fruit interests were awakening to the reality that the main consideration upon which their attention should be focussed is that of the development of markets and not ports.

"The fact that this shipment was discharged and sold the next day and that the merchants were drawing upon London and Southampton for immediate further supplies is alone a testimony as to the possibilities of a huge development of trade on our Northern markets, particularly Glasgow," said Mr. Ford.

"It also shows," he continued, "that given direct supplies in a fresh and undamaged condition, unhampered by the wastage of approximately 2s. per case involved in the dumping of supplies for our markets at Southampton—500 miles away—this market is not only capable of being one of the most important outlets for the growing expansion of the South African fruit industry, but, with the removal of these disadvantages, will return to the producers in South Africa prices at least comparable and frequently better than those obtained on Southern markets."

Mr. Ford also sees the possibility of South African deciduous fruits, which are growing in popularity in Scotland, being supplied direct in growing quantities to the Glasgow market, and we understand that it is his intention to pursue the development of trade in other South African products, not only with a view to a wider development of trade between South Africa and Glasgow, but also to ensuring that with the gradual establishment of a direct service of steamers there shall be adequate and growing support for such service.

Development of Canadian Cattle Trade

Leyland Liner's Large Shipment.

The largest shipment of cattle ever purchased from Canada by an individual importer arrived at Glasgow on Saturday, the 21st October, in the Leyland liner "Nortonian." It consisted of 502 two-year-old bullocks, which constitute a single transaction carried through by Mr. Jack Byers, manager of the Western Stockbrokers' Association, Canada, and Mr. Frank J. Moralee, of Walwick Farm, Humshaugh, Northumberland. The cattle were landed at the Clyde Trust Lairages, and after the necessary 10 hours detention, were despatched by two special trains, comprising 50 trucks, from Glasgow to Northumberland the following day. This shipment was the result of negotiations entered into some time ago, and not only constitutes a record purchase by one buyer on this side, but holds out the possibility of a new departure in connection with trade in Canadian cattle.

The transport of the cattle from Canada, their discharge, housing in Glasgow and subsequent despatch to the three large farms of Mr. Moralee in Northumberland, was made possible by the help of the Canadian Department of Trade and Commerce, and also the co-operation of Mr. W. A. Wilson, Agricultural and Animal Products Representative for Canada in London, with the Clyde Trust. The cattle were first loaded in Alberta on to a special train and taken to Montreal, being inspected prior to loading aboard the "Nortonian" by Mr. J. G. Parmelee, Deputy Minister of the Department of Trade and Commerce, and other officials of that Department.

Trade in Canadian cattle with Glasgow has materially increased during the current year, something like 11,000 head having been shipped between January and October, all of which are accommodated on arrival in the lairages owned and controlled by the Clyde Trust.

W. & T. Avery, Ltd.: New Appointment

Mr. P. H. Mills has been appointed managing director of W. and T. Avery, Ltd., to succeed the late Sir Gilbert Vyle, K.B.E. Mr. Mills received his early training in the well-known firm of W. B. Peat and Co. He joined Avery's in 1919, and



the work he did was recognised by his appointment as general manager in 1924. Noticeable features of his management were the modernisation of the products and manufacturing facilities of this old-established company.

Mr. Mills joined the Avery board of directors in 1927. His many friends throughout British industry will be pleased to hear of the latest acknowledgment of his abilities, and the many customers of this well-known firm will be pleased to hear that its future management is in such good hands.

Reconstruction of Jetties at Queenborough

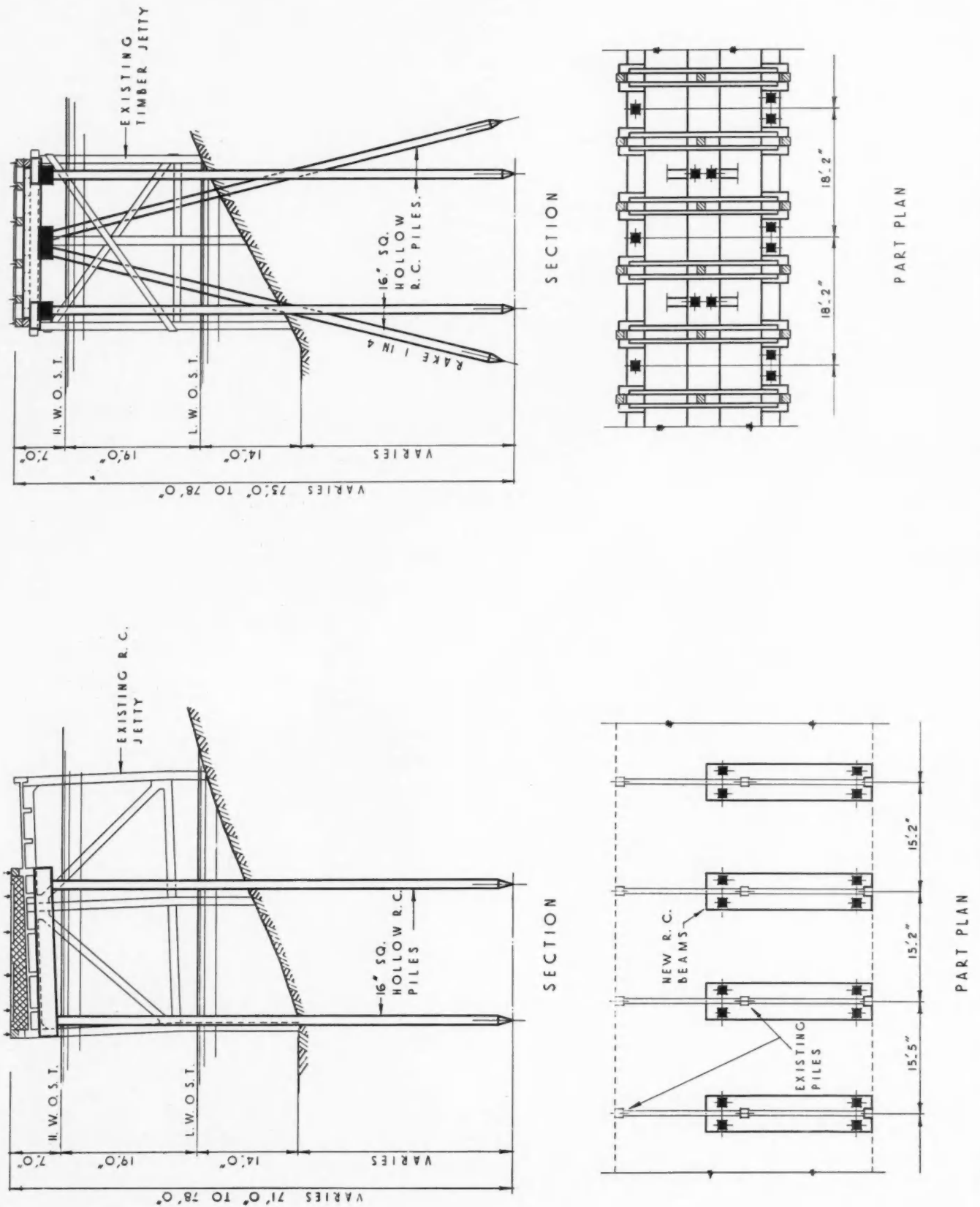


Fig 2.

Reconstruction of Jetties at Queenborough

By G. P. MANNING, M.Eng., A.M.I.C.E.

Existing Work.

THE coaling jetty belonging to Settle, Speakman and Co., Ltd., is in two parts: a reinforced concrete jetty with a frontage of some 190-ft. with a curved approach from the shore, and a timber extension about 120-ft. long. The jetties were examined early in 1933. The seaward side of the concrete jetty had sunk, the maximum sinkage being about 2-ft. The structure leaned to seaward and had reached a dangerous state of deterioration. The timber jetty showed heavy deterioration of the piles and braces near low water level, some of the piles which were originally 14-in. by 14-in. being reduced to about 7-in. diameter (see Fig. 1).

Nature of Reconstruction.

It was decided to drive new reinforced concrete piles to take the whole weight of the timber jetty with new longitudinal main girders and cross-girders in reinforced concrete. The existing timber rail-bearers are retained, and the old timber piles and braces are left as fendering.



Fig. 1.

New piles are provided to carry the two seaward bays of the old concrete jetty. These piles carry new wide cross-beams which, by reducing the span, materially strengthen the old concrete rail-bearers. The whole of the old concrete work is retained to act as stiffening and is being extensively repaired and patched. Details of the reconstruction are shown in Fig. 2.

New Piles.

The new piles were made at Dagenham Dock and are of "Williams" hollow section. They are 16-in. by 16-in. with a 10-in. diameter intermittent central hollow core, and are 70-ft. long.

Pile Driving.

The pile frame was mounted on an under-carriage running on four bogies. The under-carriage had detachable cantilever wings, as the frame had to overhang the jetty to drive the new rakers, the driving unit being a 3-ton single-acting steam hammer (see Figs. 3 and 4). Satisfactory sets were obtained at depths of 70-ft. to 78-ft. below deck level.



Fig. 3.

Progress.

Work was commenced on June 12th and the last beams were concreted on August 18th. Although the reconstruction naturally interfered with the full working of the jetty, unloading operations were totally suspended for only three weeks.

The reconstruction work was designed and carried out by Peter Lind and Co., Ltd.



Fig. 4.

Book Review

Summary of Building Research Technical Paper No. 14. *The Influence of Temperature upon the Strength Development of Concrete.* Published by H.M. Stationery Office; 2s. net.

A Building Research Technical Paper issued recently by the Department of Scientific and Industrial Research deals with the influence of temperature upon the strength development of concrete. The subject is one of considerable practical importance both in reinforced concrete construction and in mass concrete work.

In reinforced concrete work it is difficult to formulate rules for striking shuttering, etc., without some idea what effects are likely to be produced by external temperature conditions on different particular types of concrete. In mass concrete work recent observations have shown that the rise of temperature during the process of setting and hardening may be considerable and have a marked effect upon the strength developed.

"It is only within the last few years," the Report states, "that it has been realised that the expansion due to heat hydration of the cement, followed by contraction on subsequent cooling, has been largely responsible for the detrimental cracks that have been observed in large concrete masses."

Special Specification issued in America.

In America special specifications calling for the selection of cements with a low evolution of heat have been enforced in connection with the erection of the great Hoover Dam and the Pine Canyon Dam at Pasadena, California.

The Report contains the latest results of laboratory work at the Building Research Station, corroborated by full scale tests, on the evolution of heat in concrete during setting. These experiments, it is believed, form the most complete examination of the subject yet made anywhere in the world.

The results show that in small members of Portland cement concrete it is desirable to conserve the heat evolved during the process of hydration in order to accelerate the strength development. In mass concrete work where high internal temperature may subsequently result in extensive contraction tending to the formation of cracks, the results would seem to confirm the desirability of using Portland cements which have a slow rate of evolution of heat. When high alumina cement is used, every effort should be made to dissipate the heat evolved as quickly as possible.

Ingenious Application of Photo-Electric Cell.

The Report includes an account of an ingenious electrical method by which the heat developed in a small test specimen of concrete in the process of setting, placed in a vacuum flask, is used to cause a beam of light to fall on a series of photo-electric cells. These, in turn, by means of a radio valve amplifier, operate electric heaters placed in water surrounding the vacuum flask in such a way that the test piece is exposed to the same conditions as it would experience if it was at the centre of a large mass of similar concrete. The apparatus also enables a number of other small test pieces immersed in water to be put through the same series of temperature changes as the original specimen. In this way strength development of the concrete in the middle of a mass may be followed by measurements on the small test specimen.

The Effects of Cold Weather.

Other sections of the Report deal with the effects of external temperature upon the development of strength in concrete. The effects are very marked with normal or rapid-hardening Portland cement concrete, especially in the early stages of maturing. Hardening is much delayed by the action of cold. Investigation has shown, the Report states:—

"The importance of protecting small or thin concrete members, such as columns, floors and wall slabs, from the action of cold when using rapid-hardening Portland cement. It is not only important to guard against frosts in such cases, but it would appear from the tests carried out that to take full advantage of the rapid-hardening properties of the cement, it is also imperative that precautionary measures be taken to protect the concrete after it has been placed if the thermometer is falling below 10 deg. C. (50 deg. F.).

"In specifying strength values to be attained by concrete sampled on the job at early ages, it is evident that the maturing temperature must be carefully considered. Even the temperature range of 14.4 deg. C. (58 deg. F.) to 17.8 deg. C. (64 deg. F.), as laid down in the British Standard Specification for Portland cement, permits considerable variation in the early strength of concrete. Within this temperature range there appears to be a variation of 30 per cent. in the strength at 24 hours."

The effects of temperature upon the strength are not so marked at later ages, and there is no very significant difference in the strength of Portland cement concrete after 28 days when

cured within the yearly range of temperatures likely to be experienced on the job. With high alumina cement a considerable falling off in strength has been observed in the laboratory tests when the concrete has matured at the temperatures above 68 deg. F. Observations from tests extending over a period of years on high alumina cement concrete have shown that if proper precautions are taken to keep the concrete cool during its early history very good results are obtained, and the very high early strength, which makes this type of cement so valuable, is not impaired.

Special Precautions for Marine Work.

Cases sometimes arise in using rapid-hardening Portland cements in which very early strength, in a matter of hours, must be assured, as, for example, in marine work when placing between successive tides, or when the time available for the use of forms and shuttering is very limited. Much can be done to achieve an acceleration in strength development, especially in cold weather, by conserving the heat generated by the cement after placing by providing adequate heat insulation round the concrete or by heating the materials and appliances when mixing and placing. When using high alumina cement, however, the pre-heating of materials is undesirable.

Hot Cement.

Another section of the work deals with "hot cement," i.e., cement hot to the touch. Cement becomes heated by friction during the process of grinding, and generally the finer the grinding the higher will be the temperature of the cement as it leaves the mills. To meet the large demands for Portland cement it has apparently been necessary for manufacturers in recent years to deliver consignments direct from the mills to the construction job. It often happens, therefore, that cement, and more particularly rapid-hardening cement and cement stored in paper bags, is appreciably hot to the touch as it arrives on the site, and uncertainty sometimes exists as to the quality of the concrete which would result from the use of this so-called "hot cement." Tests are recorded in the report carried out on a normal Portland cement, conforming to the current British Standard Specification, taken direct from the conveyor belt at the grinding mills. These have shown that the effects of using "hot" Portland cement under conditions likely to be found on a job are unimportant.

Temperature of Storage of Cement.

In hot climates or in the hold of a ship cement may be for some weeks at a fairly high temperature, or, on the other hand, it may be subjected to very low temperatures during a hard winter or in a low climate. Experiments at the Building Research Station have shown that providing the Portland cement or high alumina cement is stored in air-tight containers, which themselves will not deteriorate under the action of heat or cold, the strength of concrete prepared from such cement is not likely to be seriously impaired by the effects of the temperatures at which it is stored.

Weser Inland Shipping in August, 1933

Water conditions on the Weser were again unfavourable in August. The Upper Weser had to be assisted by supply of water from the Eder reservoir. On the Middle Weser also water was insufficient for full loading.

One hundred and forty-five thousand tons of goods traffic through the Bremen Weser Lock in August, both up and down stream, was 6,500 tons, or 5 per cent. more than in July, and 31,000 tons or 27 per cent. more than in August, 1932. Down-stream traffic during the month under review was 119,300 tons; that is 16,400 tons more than in the previous month. The increase is chiefly due to increased transports of coal, gravel and sand, however; coal transport in the past months has been exceptionally low. Up-stream cargoes amounting to 25,700 tons showed a decline of 38 per cent. Piece goods and grain decreased considerably. Compared with August, 1932, quantity of goods transported down-stream was 30,000, or one-third larger; up-stream, on the other hand, there was only a slight improvement (1,100 tons=4 per cent.).

During the months from January-August, 1933, traffic at 934,900 tons increased by 90,700 tons, or 11 per cent., compared with the similar period in 1932; down-stream traffic was 696,000 tons, or 17 per cent. larger. Piece goods and salt showed slight increases; 288,900 tons of up-stream traffic meant a falling off of 10,300 tons, as the decrease in grain and flour could not be counterbalanced by increased traffic in piece goods, phosphate, scrap, timber, coal and rice.

Public Works, Roads and Transport Exhibition

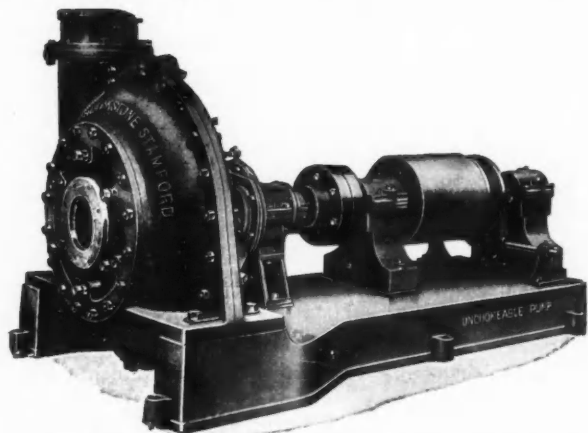
The following is a Detailed List of some of the Exhibits which will be on Show at the Royal Agricultural Hall, London, from November 13th to 18th, 1933

BLACKSTONE & CO., LTD., Stanford, Stand No. 79, will be exhibiting Power Plant and "Unchokeable" Pumps.

Power Plant.

A Blackstone "Spring-Injection" horizontal, cold starting Heavy-Fuel-Oil Engine of 55 b.h.p., representative of sizes ranging from 55 b.h.p. to 173 b.h.p. These engines are also made in multi-cylinder sizes from 34 b.h.p. up to 1,200 b.h.p., and small units including portables from 6 b.h.p. to 54 b.h.p.

The Blackstone High-Speed B.P.V. Series Vertical Diesel-Oil Engines, a range of small power vertical units to meet power requirements of every kind, stationary or portable. The engines exhibited range in sizes from 10 b.h.p. (single cylinder) to 60 b.h.p. (six cylinder) and include a 4-cylinder engine fitted portable compressor plant.



A Blackstone "Unchokeable" Pump, suitable for pumping sand, gravel, ash, clinker, etc.

Special attention is directed to the Engine Exhibit arranged for automatic starting and stopping now used with Blackstone Automatic "Unchokeable" Pumping Plants and Electric Plants. It can be controlled by float switch, remote press button control, or by a predetermined load demand from a battery. This is an entirely new exhibit by this Company.

Blackstone "Unchokeable" Pumping Plant.

Complete plants for any pumping duty can be supplied driven by electric motor, or petrol, or diesel oil engine. With reference to the last-mentioned drive, fully automatic oil engine driven "Unchokeable" Pumping Plants are now supplied. Such sets are entirely independent of an outside electric supply, and are extremely valuable in districts at home and abroad remote from an electric supply or where the cost of electricity would add considerably to the cost of pumping.

A 3-in. "Unchokeable" Pump will be shown working to clearly indicate the "full-way" principle, and will be operated by the fully automatic oil engine drive and, in addition, the exhibit will consist of four "Unchokeable" pumps of varying sizes.

THE BRITISH STEEL PILING CO., LTD., Thames House, Millbank, S.W.1, Stand No. 58, will be exhibiting models and samples of their manufactures.

The British Steel Piling Company is the largest organisation of steel sheet piling and pile driving plant manufacturers in the world, and their products cover the whole range of equipment required for all types of pile driving work.

Foremost amongst these is Larssen Steel Sheet Piling, which will be represented by a full-size length of river wall, and by a model of dock walls and a lock. This section of piling, rolled by the Cargo Fleet Iron Co., Ltd., at Middlesbrough, combines all the properties desirable for all classes of both permanent and temporary work. The shape of the section permits the piles to be driven and withdrawn easily and without distortion; the interlock—virtually a dovetailed joint in steel—is located on the neutral axis, where the stresses are least, and the maximum possible strength is combined with the minimum weight. These advantages make Larssen Piling particularly suitable for permanent work, and in this capacity it has been responsible for important development in engineering practice since its introduction a few years ago.

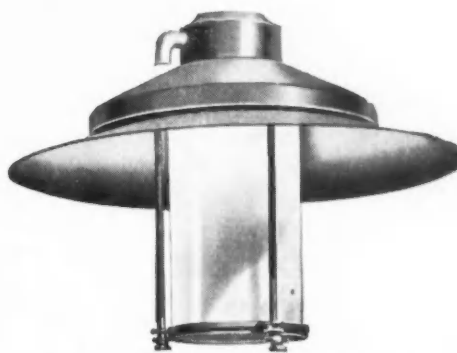
The manufacture of pile-driving plants, which forms an important part of the B.S.P. organisation, will be illustrated by models of McKiernan-Terry Hammers, which are so well known as not to require a detailed description. The advantages they possess and their economy in operation have long ago made them a standard piece of contractor's equipment, particularly for driving steel sheet piling. One of the models exhibited will be of the submarine type, which can drive piles under water.

A complete model of a "Vibro" pile driving plant, to a scale of 1-in. to 1-ft., will also be exhibited, together with a full-size "Prestcore" pile excavated after formation. The latter, formed by a system which involves no vibration and requires only a few feet of headroom, has already been successfully employed on a large number of contracts, although it was only introduced a few months ago.

The service department maintained by the B.S.P. Co. is at the free disposal of all prospective clients for any advice and designs required in connection with work involving the use of piling in any form.

THE BRITISH THOMSON-HOUSTON CO., LTD., Crown House, Aldwych, W.C.2.

This firm's exhibit will be devoted entirely to the wonderful new Mazda Mercra Lamps for the lighting of highways and outdoor areas, and the fittings used in conjunction with the lamps.



B.T.H. Circular Fitting (CIR type), for use with Mazda Mercra Lamp.



The Mazda Mercra Lamp

The development of the Mazda Mercra Lamp has made practical the use of a light source of a greater efficiency than hitherto has been commercially possible. It employs no heated filament; the light emanates from mercury vapour at high pressure. It is a gas discharge tube containing a rare gas which enables it to start on ordinary mains voltages, and its efficiency is $2\frac{1}{2}$ times that of the normal incandescent filament lamp of equivalent size. In its present size its capacity is 400 watts, and its approximate initial light output 16,000



B.T.H. Directional Fitting (DIR type), for use with Mazda Mercra Lamp.

lumens. The lamp is enclosed in a special heat-resisting glass bulb, which eliminates softening, cracking or blackening. In order to conserve heat, this bulb is surrounded by a vacuum jacket functioning like a vacuum flask. The lamp fits into a Goliath Edison Screw socket, and it requires only a simple series choke to render it suitable for all standard voltage A.C. circuits. The Mazda Mercra Lamp emits a blue-tinged light, which, although unusual, is not displeasing, and lends itself eminently to street lighting, floodlighting, etc.

Public Works, Roads and Transport Exhibition—continued

The fittings exhibited are known as the Directional (DIR type) and the Circular (CIR type). The former is designed for highway lighting where the major portion of the light has to be confined to the road surface under directional control. The Circular fitting (CIR type) is designed to give a good spread of well-diffused light. Where the lighting is required to cover large areas such as railway yards, docks, car parks, etc., this fitting is eminently suitable.

THE CROFT GRANITE, BRICK AND CONCRETE CO., LTD., Croft, nr. Leicester, Stand No. 46.

A complete range of road-making materials will be displayed, including "Croftmac" Tarred Leicestershire Granite; Leicestershire Broken Granite and Chippings; Leicestershire Granite Kerb and Setts; "Hardmac" Tarred Welsh Granite; Welsh Broken Granite and Chippings; Jersey Broken Granite and Chippings. Samples of Concreting Aggregates and Filtering Media will also be shown. These materials have been extensively used in many large and important works.

A range of concrete products will also be exhibited on this stand, including Paving Flags (Croft Adamant Granite Concrete Paving Flags have been on the market for over 40 years); Plain and Reinforced Concrete Tubes; Reinforced Concrete Manholes; Granite Concrete Kerb and Channel; Granite Concrete Fence and Rail Posts, Line Posts, Gas and Water Indicator Posts; Concrete Door Hoods and Brackets for Housing Schemes.

The Croft Granite Company will also be displaying samples of their "Adamant" and "Hydromant" Reconstructed Stone, together with samples of Croft "Adamant" Marble.

THE CONSOLIDATED PNEUMATIC TOOL CO., LTD., Egyptian House, 170, Piccadilly, London, W.1., Stand No. 82, are exhibiting—

Portable Plants.

A Diesel Engine Driven Portable Plant fitted with a Dorman Engine, also a Petrol Engine Driven Portable to meet the requirements of contractors, public works, railways and shipyards, where a portable plant can be used.

Road Breaking Drills.

CP-116 Pneumatic Road Breaking and Demolition Tools. This machine can be easily converted into a pile driver or a clay digger for heavy work.

Pneumatic Pile Driver.

The CP-116 Pneumatic Pile or Sheet Piling Driver fitted with front and designed for taking wooden sheeting or steel sheet piling for trench work or excavations. Fitted with two guide plates and adjusting plates for various sizes of piles.

Pneumatic Clay Diggers.

The CP No. 3 Pneumatic Clay Digger for ordinary trench work and tunnelling, also the CP-111 Clay Digger for heavy work.

Pneumatic Tampers.

CP Pneumatic Tampers of various sizes suitable for backfilling trenches. No subsidence follows the use of these tampers. They are also suitable for foundry work and for making artificial stone.

Pneumatic Sump Pumps.

Driven by the CP Rotary Air Motor, specially adapted for pumping surplus water from manholes, ditches, tanks, pits or trenches, quickly and cheaply. No priming required.

Pneumatic Hammers.

A complete series of the well-known Boyer Riveting Hammers for dealing with rivets from $\frac{5}{16}$ -in. to $1\frac{1}{2}$ -in. These hammers are particularly useful for riveting various types of steel buildings. Also complete range of Boyer Chipping, Caulking, Scaling, Paint Scraping and Stone Carving Hammers.

Pneumatic Rock Drills.

A complete range of CP Rock Drills for quarry and mining work.

Rotary Pneumatic Drills and Grinders.

CP Rotary Drills of various sizes to suit all requirements, for drilling, reaming, tapping and wood-boring.

CP Rotary Grinders for all types of grinding, especially for touching up dies, aeroplane work, grinding pencils and shaped sticks, for grinding on bridge construction work, for light grinding operations in foundries and internal grinding on stainless steel castings; also for grinding small lobes of metal raised by spot welding.

Cement Injector.

A compressed air grout injector for injecting cement or mortar into cracks, joints and in interstices, and is invaluable for repairing and reinforcing walls on any structure threatened with subsidence or in need of repair.

Pneumatic Vibrators.

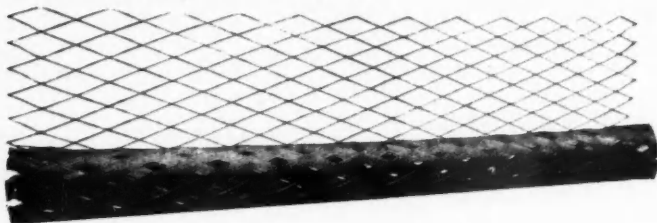
Vibration is the most efficient and economical method of obtaining the maximum density in concrete work. The strength of the concrete is increased, and the surface is free from honey-combing and other blemishes. Vibration eliminates any risk of loss on contact between reinforcement and the concrete, even in the thinnest sections, thus avoiding the danger of displacing the reinforcement and reducing the amount of cover on the bars, as in hand reaming.

THE EXPANDED METAL CO., LTD., Burwood House, Caxton Street, London, S.W.1, Stand No. 44, are showing:—

"Expamet" Expanded Steel, in its various meshes and weights, is used for all forms of reinforced concrete and fire-resistant construction.

"RR" 6-in. mesh "Expamet" Expanded Steel is particularly suitable for use as reinforcement in concrete roadways, tramways, pavings, etc.

"BB" Expanded Metal Lathing affords an ideal "key" for plaster, in ceilings, solid and hollow walls and partitions, and all other classes of plaster construction.



A Roll of "RR" 6-in. Mesh "Expamet."

"Ribmet," "Z" Type 9 is applicable in plasterwork, particularly where the bearers are too far apart for plain sheet lathing.

"X" Type "Ribmet" is used as a combined permanent centring and reinforcement for concrete flooring, roofing, etc.

"Exmet" was designed specially as a reinforcement for brickwork.

Samples of the foregoing materials are on view, and examples of some in actual use also are shown.

Photographs of a few important contracts in which "Expamet" Expanded Metal Products were used, and models showing constructional details, form an attractive display which is of special interest to municipal engineers and surveyors.

As well as being an ideal reinforcement for concrete, "Expamet" is also an attractive fencing material and, in its smaller meshes, adapts itself to effective and economical tree guards, refuse baskets, and the like.

FRASER & CHALMERS ENGINEERING WORKS, Erith, Kent (Proprietors: The General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2), Stand No. 133.

Crushing, screening and conveying are problems that this company have specialised upon for years, and their exhibits of Vibratory Screens, mechanical and electrical, with a Portable Conveyor, are the result of accumulated years of experience. They have been responsible for some of the most modern and up-to-date screening and handling equipment in this country, and in their association with the General Electric Co., Ltd., have carried out the complete electrification of various quarries.

The Robins-Gyrex Double Deck Screen exhibited is a mechanically operated screen for medium and heavy duties, and for capacities up to the maximum demanded, and can be supplied with single, double or triple decks.

The Robins-Vibrex Single Deck Screen is also mechanically vibrated and is for medium duties.

In both screens the action is uniform over the entire screening surface; there are no "dead spots," and the stroke of vibrations may be varied so that with corresponding variation of speed, the most efficient screening action may be obtained.

Size of screening surface varies from 2-ft. by 4-ft. 6-in. to 6-ft. by 12-ft.

The "Sherwen" Screen exhibited is a new development in efficient screening. The moving frame is rapidly vibrated electrically, 3,000 vibrations per minute being imparted to the screen. It has a remarkably small power consumption, requires no lubrication, and is easy to operate. The amplitude of vibration and screening slope are easily altered.

The Robins Portable Conveyor is the most economical of portables, its rugged construction and special features of design enabling it to be operated at lower cost per ton handled, and ensures continued successful operation. In stock at Erith in four sizes, 20-ft., 25-ft., 30-ft. and 35-ft., either electric or petrol-paraffin engine driven.

Fraser and Chalmers' engineers will be in constant attendance on the stand throughout the Exhibition, and will be pleased to be of assistance in any crushing, screening or conveying problems.

Public Works, Roads and Transport Exhibition—continued

THE LINER CONCRETE MACHINERY CO., Newcastle-upon-Tyne, will be showing a full range of their Concrete Machinery—Tilting Drum Concrete Mixers, Roller-Pan Concrete Mixers, Revolving Pan Star Type Concrete Mixers, Vibrating Machines, Slab, Block and Brick Machines, Moulds, etc.

For the first time they will be exhibiting a Rotary Drum Concrete Mixer, the details of which are as follows:—

The "Liner" Rotary Drum Mixer (patents pending).

When "Liner" Engineers were asked to design a Rotary Drum Concrete Mixer they were told pretty plainly that they had to get away from existing Rotary-drum practice, or, in other words, to make some definite advance in design. That they succeeded has been amply demonstrated. Undoubtedly the two most important features of the machine they designed are:—

The Direct-drive Through Rubber-tyred Rollers.

The Mixing Drum is mounted on four rubber-tyred rollers, two of which are driven by the engine through machine-cut gear wheels. This method of mounting and of driving the drum obviously has great advantages, viz.:—

(a) It dispenses entirely with the customary gear ring or chain wheel around the drum. Not only does this cut out an unsatisfactory part, but it enables the drum to be readily removed from the machine.

(b) A smooth, even and silent rotation of the drum is obtained with no metal-to-metal contact, and with no external wear of the drum.

(c) Less noise means less vibration, and consequently less wear.

Free-Engine or Out-of-Gear Device.

This obviates the necessity of having the usual clutch between the engine and the drum. In the "Liner" Mixer all that one does to put the machine out of gear when cranking up the engine is to lift the drum off the driven tyres by means of the hand-wheel. The drum is then lowered on to the revolving tyres and likewise commences to revolve. Very simple indeed, and yet cuts out a troublesome clutch.

Two Other Advantages which no other Rotary-Drum Mixer had.

The machine is direct-driven through machine-cut gear wheels without a single chain.

Except when in gear, that is, with clutch in and hopper being raised, the brake is automatically always on. The direction in which the control lever is moved for the ingear or hoisting position is directly opposite to that for the lowering position instead of the lowering position being, as usual, half-way between the hoisting and the braking position.

The effect of this is to dispense almost entirely with the gap or period when the hopper is out of control when changing from hoisting to lowering and *vice versa*. Safe and smooth working results without the usual necessity for fine adjustment and wear and tear is reduced.

R. A. LISTER & CO., LTD., Dursley, Gloucestershire, Stand No. 42, are exhibiting a range of "Diesel" Engines, Petrol Engines, and also Auto-Trucks for cleansing requirements.

Among the Lister "Diesel" Engines are two new and outstanding models, a twin-cylinder of 14 h.p. and a single-cylinder of 3 h.p. The twin-cylinder engine, Mark C.E., has a 10 h.p.-16 h.p., rating at 800 r.p.m.-1,200 r.p.m., and is built on most advanced lines, which indicate the latest practice in "Diesel" engine design. Several notable features are included. First amongst these is the single lever which controls the well-known Lister Patent Dual Combustion Chamber and relieves compression for cranking, raises it to obtain an absolutely positive start from cold and lowers it for normal running.

The small single-cylinder model, Mark 3/1, develops 3 h.p. at 600 r.p.m. and is believed to be the smallest "Diesel" engine built on mass production lines. It is, however, extremely robust, and the cooling hopper and fuel tank are compactly mounted on the engine itself.

The third "Diesel" engine on view is a three-cylinder model developing 27 h.p.-31 h.p. at 1,000 r.p.m.-1,200 r.p.m., and is a popular prime mover for such layouts as Air Compressors, Cranes, Pumps, Locomotives and Stonebreakers.

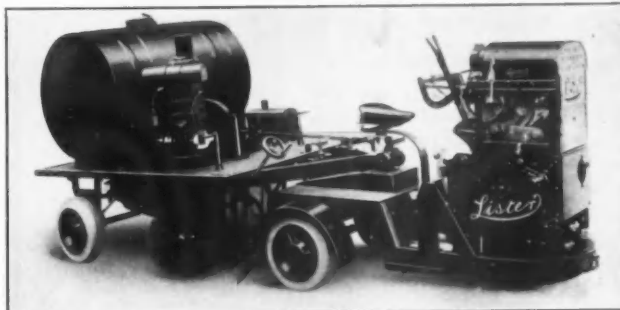
Two petrol engines are shown, of which the smaller is the "F" type, rated up to 4 h.p. at 1,500 r.p.m. This engine is designed on the same lines as the well-known "D" type of 1½ h.p. and is manufactured of special materials ensuring great efficiency at high running speeds. Special and careful balancing of all parts also ensures rigidity of construction and durability.

The other petrol model shown is the "CA" type, rated from 6 h.p. at 800 r.p.m. to 12 h.p. at 1,500 r.p.m., and mounted in a sheet steel housing with radiator cooling equipment complete.

Auto-Trucks.

New additions to the range of Lister Auto-Trucks are on view. These include a "Two Trucks in One" Auto-Truck

cleansing equipment suitable for municipal and industrial service, comprising a Lister Auto-Truck Tractor Unit with interchangeable Sweeper-Sprinkler and Refuse Collecting Trailers. Important features of this Auto-Truck Cleansing Equipment are its extreme "manœuvrability," low running cost and its elimination of time wastage. The interchangeability of the



"Two Trucks in One" Auto-Truck Cleansing Equipment

Sweeper-Sprinkler Trailer with the Refuse collecting Trailer ensures the greatest economy, because the Truck can be worked in one capacity or another for the maximum number of hours each day, with a minimum of capital outlay.

MILLARS' MACHINERY CO., LTD., Pinners' Hall, London, E.C.2, Stand No. 54, are exhibiting:—

Millars' Portable 10-ton per hour high and low temperature Drying and Mixing Plant for the production of tarmacadam, bituminous macadam and asphaltic mixtures. A dual purpose plant designed to eliminate the necessity of two separate plants being installed for the two separate classes of work.

Millars' 14/10-NT Closed Drum Concrete Mixer, fitted with automatic power loader and vibrator; 6 h.p. Diesel engine. Stub axles arranged for end or side discharge. Capacity: 140/150 cu. yds. per 8-hour day.

Millars-Jaeger 10/7-L Tilting Drum Type Concrete Mixer, with automatic loader and vibrator; 5 h.p. petrol engine. Stub axles arranged for end or side discharge. Capacity: 80 cu. yds. per 8-hour day.

Millars-Jaeger 7/5-SE Tilting Drum Type Concrete Mixer, without loader, fitted with 2 h.p. petrol engine. Capacity: 40 cu. yds. per 8-hour day.

Millars-Jaeger 4/3-ST Tilting Drum Type Concrete Mixer, without loader, fitted with 1½ h.p. petrol engine. Capacity: 20 cu. yds. per 8-hour day.

Millars' 4-ft. 6-in. Diameter Roller Pan Mixer, fitted with 5 h.p. petrol engine and special distributing water tank; suitable for sand/lime, sand/cement mortar, black mortar and brick rubble mortar.

New Model Millars' Tractor, with British-made Ford industrial engine; 30 cu. ft. end dump body; Dunlop pneumatic tyres; turning radius 10-ft. Suitable for use in confined areas, on roads or on private premises.

Millars' 4-in. Double Diaphragm Suction Pump, fitted with 4 h.p. horizontal petrol engine. Capacity: Up to 14,500 gallons per hour.

Millars' 4-in. Single Diaphragm Pump, fitted with 3-h.p. horizontal petrol engine. Capacity: Up to 8,500 gallons per hour.

6 cu. ft. Capacity Millars' All Steel Concrete Cart, with new type wheels.

PETTERS, LTD., Yeovil, England, Stand No. 5.

The stand of Petters, Ltd., of Yeovil, contains a representative selection of their well-known oil engines and combination sets specially suitable for road-making and contractors' purposes.

In addition to representations of their small paraffin engines in sizes 1½, 3 and 5 b.h.p., and of their 2 and 4 b.h.p. air-cooled petrol engines, Petters, Ltd., have on exhibit three of the small sizes of Atomic Diesel engines which they manufacture, namely, 5, 8 and 15 b.h.p. These engines (which are among the latest additions to the series of engines of this type made in sizes up to 540 b.h.p.) operate on gas oil and other cheap fuel oils readily obtainable for use in Diesel engines, and have a fuel consumption of .4 to .45 pints per b.h.p. per hour, according to the size of the engine. They start immediately from cold without heating device or alteration to compression. They have no inlet or exhaust valves or similar complications. Their vertical enclosed design makes them particularly suitable for hard work under adverse conditions. The governor control is extremely sensitive and the engines run well at all loads with great regularity of motion. These engines are built to Lloyd's requirements, and cover a very wide range of usefulness within their respective powers.

Public Works, Roads and Transport Exhibition—continued

Another interesting exhibit is a small contractors' plant with the Petter Universal air-cooled petrol engine of 2 b.h.p. referred to above. It is suitable for clearing water from foundations and trenches after heavy rain, also sewage tanks, ponds and bilge tanks.

A small air compressor set with a $1\frac{1}{2}$ b.h.p. paraffin engine suitable for working pressure of 350 lbs. per square inch is another interesting exhibit at this stand.

PRIESTMAN BROTHERS, LTD., Holderness Foundry, Hull, Row A, Stand No. 28.

An object of special interest on the Priestman stand is a model of the Patent "Level-Cut" Grab. This is an entirely new departure in Grab design, of which the fundamental principle of operation is that the path taken by the cutting edges of the jaws is horizontal, and the crane operator can determine the depth of cut he wishes to take. By this means a level bottom is obtained, rendering the Grab especially useful for canal dredging and ditch cleaning. The "Level-Cut" Grab has an efficiency of 200 per cent. to 500 per cent. compared with the Clamshell when working in difficult material.

There is also available on the stand descriptive literature and photographs showing the "Cub" Excavator, the only $\frac{1}{4}$ cubic yard machine of its type in the world, the production of which in 1932 has been the outstanding event of recent years in the field of mechanical excavation.

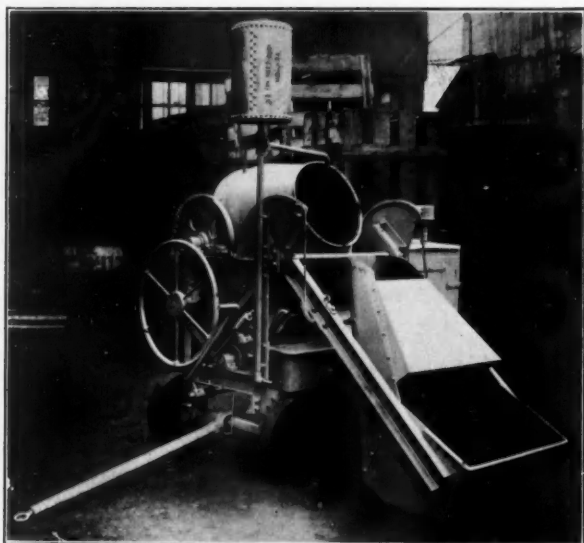
The "Cub" is a full-revolving machine weighing no more than $6\frac{1}{2}$ tons in working order, and consequently very mobile. It is the only excavator on the market that requires but two jibs to operate six attachments, namely, shovel, trencher, skimmer, dragline, grab and crane. It is driven by a 25/20 b.h.p. internal combustion engine.

Full particulars of the whole range of Priestman products—Excavators, Grabs and Grab-Dredgers—are available, as well as numerous photographs of equipment at work.

Working models of typical Grabs, as well as a Model Dredger, are exhibits of considerable interest.

RANSOMES & RAPIER, LTD., Waterside Iron Works, Ipswich, Stand No. 37, Row B, are exhibiting—

A **Featherweight Concrete Mixer**, with a batch capacity of $4\frac{1}{2}/3\frac{1}{2}$ cu. ft. The machine's portability makes it of considerable value, particularly where concrete is required at widely separated places.



The "Ransome" 4-T Concrete Mixer.

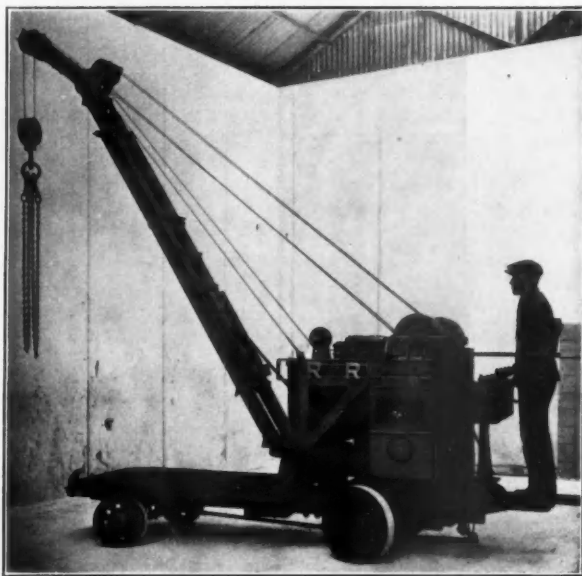
4-T Concrete Mixer, with a batch capacity of $6\frac{1}{4}$ cu. ft., is their latest machine. Lying behind the design of the 4-T is Messrs. Ransomes & Rapier's effort to give a high output with a light mixer; this purpose has been efficiently accomplished in the production of the 4-T, which only weighs just over a ton and has an output of approximately 45/50 cu. yds. per 8 hours.

The mixer on the stand will be a standard petrol-driven machine, but fitted with an electric motor for purposes of demonstration of all the operations.

7-T Concrete Mixer is another exhibit. This has a batch capacity of 10/7 cu. ft. and is fitted with a petrol engine. Like other Ransome Mixers, this machine can be mounted on a gantry to give a height of discharge, making it suitable for discharging its mixed concrete into a lorry or high-sided wagon.

Rotary Drum Mixers are represented by the 10-R machine, with a batch capacity of 14/10 cu. ft. Particular attention is drawn to this model, as it is Messrs. Ransomes & Rapier's latest design of Rotary type mixers and is fitted with a Lister high-speed petrol engine developing 9 h.p., complete with

radiator, enclosed within a steel engine house with doors for convenient inspection. Many new features are embodied in the 10-R, which weighs but 46 cwt., and is thus extremely portable for a mixer of such capacity.



The 1-ton Truck Mobile Crane.

Mobile Cranes are represented by a 1-ton Truck Type Mobile which, as its name suggests, is both a truck and a crane. It is operated on the petrol-electric system, which is a well-known feature of Ransomes & Rapier Mobile Cranes. These machines can be supplied to deal with loads up to 6 tons; the Truck Crane exhibited is of great value in connection with road contracts and the handling of excavated material.

20 h.p. Diesel Loco. is representative of the range of small contractors' locos, which can be offered by Messrs. Ransomes & Rapier.

By arrangement with the authorities a 3-ton Lorry Crane will be shown in the courtyard, where it can be demonstrated to interested clients. This Ransomes-Rapier-Thornycroft crane can handle 3 tons at 9-ft. 6-in. and $1\frac{1}{4}$ tons at 18-ft. The crane portion is mounted on a Thornycroft lorry and has a travelling speed up to the 20 m.p.h. limit. A 6-ton Lorry Crane can also be supplied, which has a duty of 6 tons at 9-ft. 6-in. and $2\frac{3}{4}$ tons at 15-ft., and is likewise mounted on a Thornycroft lorry with a travelling speed up to the 20 m.p.h. limit.

RUSTON & HORNSBY, LTD., Lincoln, Stand No. 40, Row C, will be exhibiting:—

Crude-Oil Locomotive.

Notable among the wide range of exhibits is a Ruston 16/20 h.p. loco, fitted with a fuel oil engine. This locomotive will be shown on a short length of track, along which it will be driven, thus providing an opportunity for contractors, quarry



Crude-Oil Locomotive

owners, etc., to see the ease with which the gear changing can be effected. The gearbox provides 3 speeds in either direction, and is an important factor in maintaining the high overall working speed of the locomotive. Gear changing is effected by a single change-speed and clutch lever operating in a gate, no foot action being necessary. The clutches and operating mechanism are totally enclosed in the gearbox and work in oil. The final drive is taken to both axles by interchangeable steel roller chains. An important feature is the method of springing,

Public Works, Roads and Transport Exhibition—continued

which is such that the axles move up and down on a radius with the driving chains, the tension on which is therefore unaffected by an uneven track. The engine is a two-cylinder unit, which incorporates the Lister patent combustion head, a device which ensures easy and certain starting even under the worst weather conditions.

Pumps and Pumping Plant.

An important exhibit from the contractor's point of view is a 4-in. Diaphragm Pump, driven by a Ruston petrol-paraffin engine, the drive being transmitted through a roller chain on machine-cut sprockets, and finally by machine-cut spur gearing. A valuable feature is the ease with which the diaphragms (of rubber or chrome leather) can be changed. A 3-in. hand-operated Diaphragm Pump with an output of 2,500 gallons per hour will also be shown. Another pumping exhibit will be a Centrifugal Pump, driven by a $4\frac{1}{2}$ b.h.p. petrol-paraffin engine, the whole unit being mounted on a steel frame.

Petrol-Paraffin Engine.

An interesting engine exhibit is a 3 b.h.p. Class "PB" Petrol-Paraffin Engine. Totally enclosed and automatically lubricated, this engine has proved exceedingly popular since its introduction three years ago. The engine starts on petrol and automatically turns over to paraffin in a few minutes. This particular range of engines is made in four sizes, i.e., $1\frac{1}{2}$, 3, $4\frac{1}{2}$ and 6 $\frac{1}{2}$ b.h.p.

Transportable Oil Engine.

This is a self-contained power unit, consisting of a radiator-cooled vertical oil engine of 64 b.h.p. at 1,000 r.p.m. The power unit is the well proved Ruston "VQ" Oil Engine of the 4-cycle, totally enclosed type.

Horizontal Oil Engine.

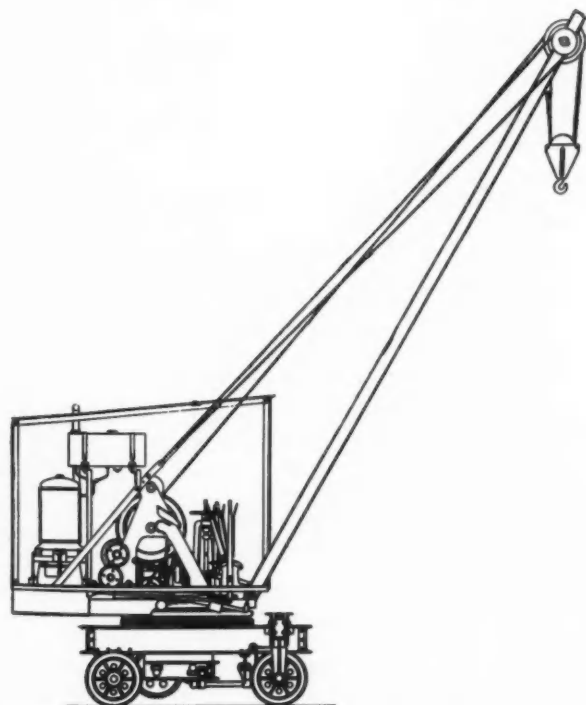
The Ruston range of Horizontal Oil Engines will be represented by a single-cylinder unit of 17 b.h.p. at 350 r.p.m. This engine runs on the well-known Ruston Airless Injection Principle, and will start from cold and operate satisfactorily on very low grades of fuel. The operation of this engine will be illustrated on the stand by a sectionalised scale model.

"Thermax" Patented Boiler.

Steam users will be interested in the "Thermax" Patented Vertical Water Tube Boiler. The boiler on show will be suitable for a working pressure of 120 lbs. per sq. in.

THOMAS SMITH & SONS (RODLEY), LTD., of Rodley, Leeds.

The works of Thomas Smith & Sons (Rodley), Ltd., of Rodley, Leeds, have been engaged upon the manufacture of appliances for the efficient handling of materials for over a century, and the range of products covers steam, electric, petrol, paraffin, diesel and hand cranes of all types; capstans, winches, turntables, single-bucket excavators, etc.



The New 2-ton Mobile Crane.

The latest development of this firm in petrol and diesel cranes takes the form of a light-weight mobile crane of 2 tons capacity specially adapted for the needs of contractors, railways, docks, wharves, stockyards, factories, etc. It may be mounted upon

rubber-tyred road wheels or rail wheels, caterpillars, or upon a 5-ton lorry chassis. Diesel or petrol engine fitted as desired. This crane with diesel engine and road wheels can be seen at the Public Works Exhibition, where it will be the main exhibit on the stand of Thomas Smith.

Data and specification concerning this crane are as follows:—

Full Circle Contractor's Crane: Weight in working order 9 tons.

Working loads: 2 tons at 14-ft. radius, $1\frac{1}{2}$ tons at 16-ft. radius, 1 ton at 20-ft. radius, and $\frac{1}{2}$ ton at 22-ft. radius.

Hoisting speed: Single rope 160-ft. per minute for loads up to 1 ton; two-part rope, 80-ft. per minute for loads from 1 to 2 tons.

Jib length: Standard 25-ft.; other lengths as desired.

Slewing speed: 5 revs. per minute.

Travelling speeds (two speeds for all models).

Road wheel mounting 4 miles per hour and $1\frac{1}{2}$ miles per hour.

Road wheel mounting (4-ft. $8\frac{1}{2}$ -in. gauge) 5 miles per hour and 2 miles per hour.

Caterpillar mounting $\frac{3}{4}$ miles per hour and 2 miles per hour.

Engine Units.

Diesel engine, 20/24 b.h.p.

Average fuel consumption $\frac{3}{4}$ gallon per hour.

Petrol paraffin engine 25/40 b.h.p.

Average fuel consumption 3 gallons per hour.

Brief Specifications.

Machine-cut gear enclosed in oil bath form the engine transmission gear.

Specially designed heavy duty clutches for transmitting the power.

Grooved rope barrels. All machine-cut gears.

"Live" ring of multi rollers for slewing.

Revolving swivel is a rigid casting upon which is mounted all brackets ensuring permanent alignment of gears.

All control levers grouped together near the driver.

Under-carriages built of British rolled steel sections securely cleated and rivetted together.

All gear drives are employed for travelling on all mountings.

Complete house enclosing driver and machinery.

STOTHERT & PITT, LTD., Bath, Stand No. 33, Row B, will be exhibiting—

Vibratory Screen.

This screen embodies, in addition to the vibratory action, an oscillating action by means of eccentrics running in ball bearings in conjunction with being suspended on springs. It is suitable for all screening problems such as coal, coke, stone, etc., and can be designed for any output and number of gradings required.

Gravel and Sand Washer.

This washer is of the contraflow type, in which the material being washed travels in the opposite direction to the water. Special arrangements are made in this machine to provide for the final washing of the material to take place in perfectly clean water. This is accomplished by passing the material through a separate barrel at the discharge end into which the clean water is discharged, the water then passing from this barrel into the main washing cylinder. The machine is mounted on rubber-tyred rollers.

The "Universal" Handsprayer.

The "Universal" handsprayer is designed to overcome the limitations of the various models already on the market, whilst retaining the general advantages of handy operation and low cost. The exhibit shows its essential features and mode of operation; by applying air pressure to the interior of the drum in which the emulsion is received, the emulsion is forced into the delivery piping to the spray jet.

The machine has been designed to accommodate any size or type of drum normally met with in commercial practice, whatever the position, type and size of the bunghole. The maximum permissible diameter and length are 25 $\frac{1}{2}$ -in. by 39-in. (640 x 990), which corresponds to the 65-gallon benzine drum, in which emulsion is sometimes packed, while the minimum dimensions are 18 $\frac{1}{2}$ -in. (470) diameter and 27-in. (685) long. This has been effected, in brief, by fitting to the wheeled framework a tipping cradle which will carry varying sizes of drums, in the vertical or horizontal positions, as desired.

Single Shaft Paddle Mixer.

This small machine is of the single shaft type, and is ideally suited for mixing tarmacadam, asphalt, or semi-dry concrete, the capacity being 4 cub. ft. Driven by a Lister petrol engine and mounted on a robust road wheel truck, it is an extremely useful unit where portability is essential.

Super-Ten Victoria Mixer.

This machine, apart from retention of the well-known principle of the drum mixing blades, incorporates many unique features. Direct coupled to an 8 b.h.p. radiator cooled Lister engine and fitted with side-loader, water tank, and spring-borne road truck, the machine deals with unmixed batches of 15 $\frac{1}{2}$

Public Works, Roads and Transport Exhibition—continued

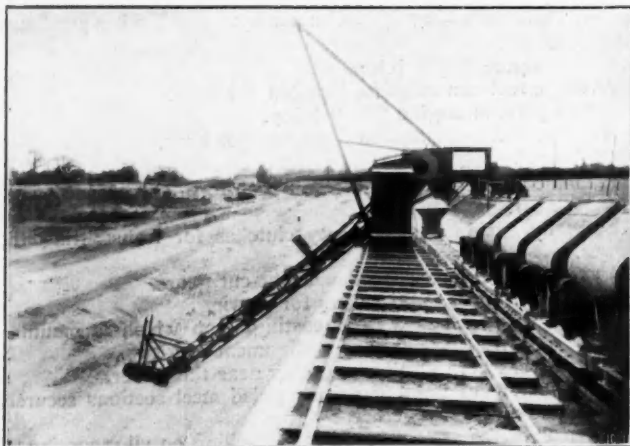
cub. ft. and weighs only 2½ tons. The water tank of syphon type is an outstanding feature, and is provided with instantaneous adjustment to regulate the delivery to the mixer drum to within one gill, perfect accuracy being ensured.

Rotary Displacement Pump.

A Rotary Displacement Pump for reversing flow as fitted to road tank vehicles for bulk handling and spraying. This pump is readily controlled to load or discharge the tank with a constant direction of rotation. For spraying, the flow can be adjusted to any desired quantity between zero and maximum, and quickly reversed from the sprayer at the end of the surface with the vehicle still in motion.

Hot Mixer.

The Sothert & Pitt Hot Mixer is a machine which will be of particular interest to those engaged in road maintenance, playground and path work, and meets the requirements of surveyors, contractors and all who wish to make tarmacadam in small quantities either on site or at a dépôt.



The Multi-Bucket Excavator.

Multi-Bucket Excavator.

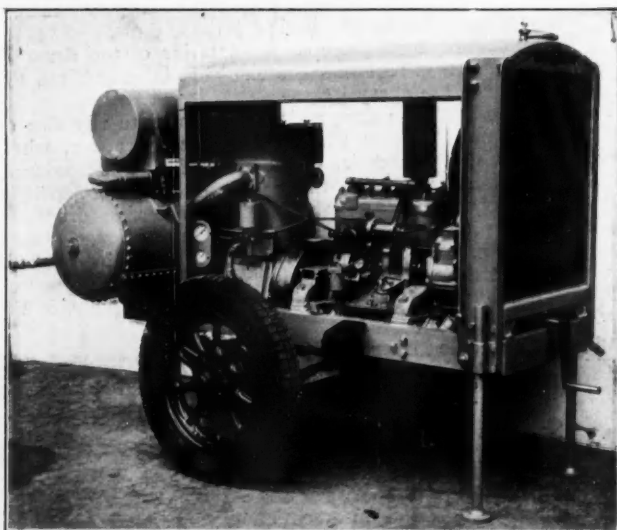
This machine is particularly suited for use in brickworks, cement works, gravel and sand pits, and offers the advantage of increased output. The exhibited equipment is diesel engine driven, mounted on rail wheel truck, and it can dig in height or depth. Electric drive can be provided when desired and the unit can be mounted on caterpillar truck. Stothert & Pitt, Ltd., have built a number of multi-bucket excavators, and particulars of the range of sizes will be supplied on application.

"Giraffe" Patent Telescopic Mast and General Purposes Crane.

This crane possesses many distinct features, and with adjustable mast will lift to heights varying from 20-ft. to 35-ft. As a general purpose crane with short jib, it is particularly suited to trench, sewer, excavation and pipe laying work. The crane will be shown in motion to demonstrate its many advantages.

SIR W. G. ARMSTRONG WHITWORTH & CO. (ENGINEERS), LTD., Scotswood Works, Newcastle-upon-Tyne, Stand No. 164 A.

This year the following products, incorporating the very latest in design and construction, will be shown.



Armstrong Whitworth Portable Air Compressor. Side covers removed to show the compact design of engine and compressor units.

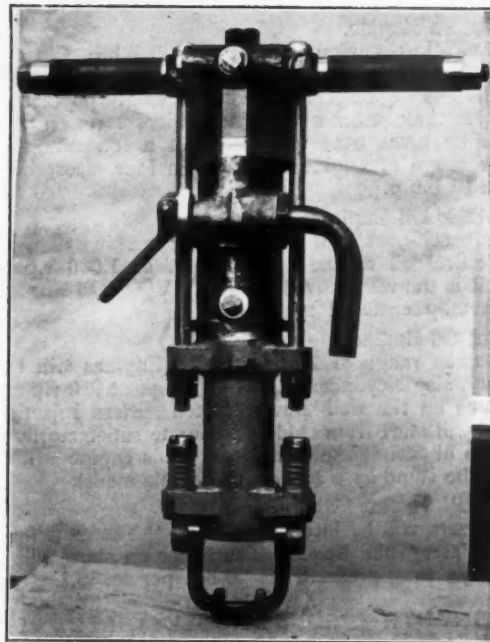
Portable Compressor.

The exhibit is representative of a complete range of sizes, and has a capacity of 120 cu. ft. (delivered) per minute at 100 lbs. per sq. in. pressure. Supplied equipped with either petrol or diesel engine, as required. This exhibit abounds with unique features, which alone warrant inspection. The complete unit is mounted on a well-sprung central axle with pneumatic-tired wheels fitted with internal expanding brakes. Other types of under-carriage can be supplied as required.

Rock Drills.

Three sizes of their latest design of rock drills will be exhibited. Nos. 157 (50 lbs. weight), 156 (40 lbs. weight), and 155 (30 lbs. weight).

No. 157 will also be shown with a cradle mounting on a tripod.



Armstrong Whitworth Rock Drill.

Concrete Breakers.

In addition, a range of their latest Type 145 (58 lbs.) concrete breakers will be on view. Some will be fitted with patent collet retainers for collarless steels. Others shown with (a) trigger retainer for collared steels and (b) fitted with special pile driving attachment.

Coal Picks.

Type 143 will be shown: (a) with spring steel retainer, (b) with screwed wedge retainer.

All the above mentioned exhibits incorporate their Patent Diaphragm Valve, which has no sliding surfaces to wear.

Heavy Trench Rammer.

Type 166, for consolidating excavated material, etc.

In addition to the foregoing tools, which are especially designed for contractors and public works use, a range of their high speed rotary grinders, suitable for dressing welds on structural steel work, steel and iron castings, etc., will be on view, together with a complete range of chipping and caulking hammers, light hammers for iron, steel and paint scaling, and stone dressing.

In conclusion, a full range of the latest and well-known Armstrong Whitworth Riveting Hammers, Jam Riveters and Holders-on, with a selection of Rotary and Reciprocating Piston Type Drills.

TILBURY CONTRACTING & DREDGING CO., LTD., Tilbury House, Petty France, Westminster, London, S.W.1, Stand No. 43, will be showing:—

Samples of Granite Kerb, Setts, Granite Chippings and Tarmacadam from their quarries in Inverkeithing, Scotland; samples of Tarred and Untarred Ragstone from their quarry in Maidstone, and they are making a special feature of their well-known Fillers and Impalpable Powders produced at their plant in Tovil Wharf, Maidstone.

These Fillers are now enjoying a very wide market, and they are produced in various grades to meet all the requirements of the makers of asphalt for road surfacing, and of the manufacturers of mastic asphalt used for road work and in buildings.